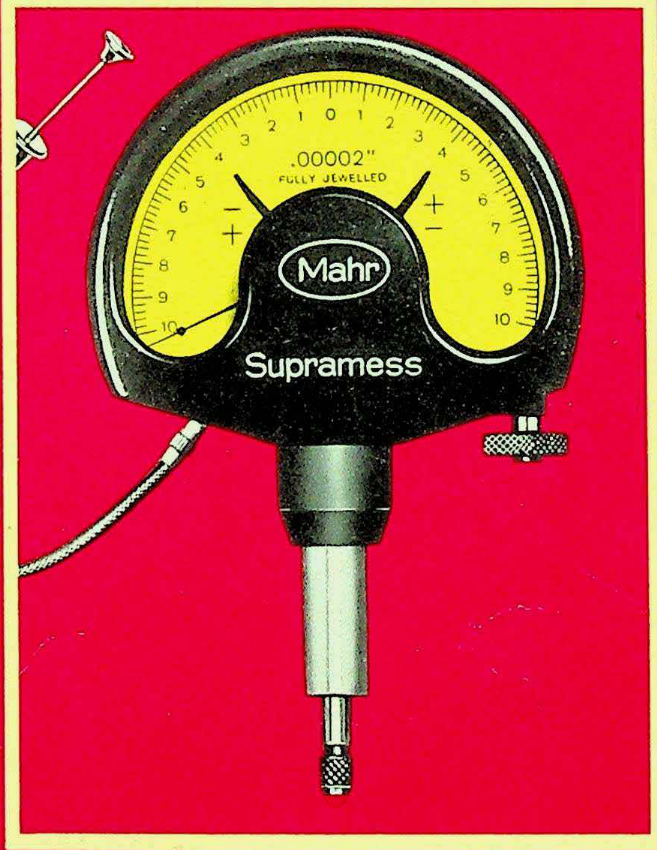
CATALOG NO. 1000

TEL. 961-1160
PRECISION
TOOL
DISTRIBUTORS INC.
2624 E. BAYSHORE FRONTAGE RD.
MOUNTAIN VIEW, CALIF. 94040

Mahr

PRECISION
Measuring Instruments


.00002"
FULLY JEWELLED
Mahr
Supramess

MODERN GAGING METHODS FOR MODERN QUALITY CONTROL

Modern Gaging Methods

through employment of MAHR indicating type gages

The increasing use of automatic equipment for assembly operations demands 100% inspection. Where formerly many customers would not complain too strenuously if they found one defective part in 100 parts purchased, some would object today vigorously if one defective part occured in each 5000. In hand assembly operations defective parts may be discovered by an operator and thrown out, but in automatic equipment, the part may be assembled into the product.

Inspection time is seldom considered part of production cost. In mass production it must be held to a minimum through employment of time saving methods. Inspection of parts with fixed gages, with plug gages or snap gages for example, may be right for short runs or in production of single parts. In mass production this method is too time consuming to be practical. Furthermore, fixed gages are **subject to wear** in constant use and they do not show the position of the work **within** the tolerance limits. To meet the requirements for high speed measuring with maximum accuracy, **indicating type gages** alone are the answer. They permit a measuring result expressed in dimensional values, and the operation is independent of the measuring "feel" and pressure used by different persons. Speed of inspection is higher than with fixed gages, because Go and NoGo measuring is not separately performed.

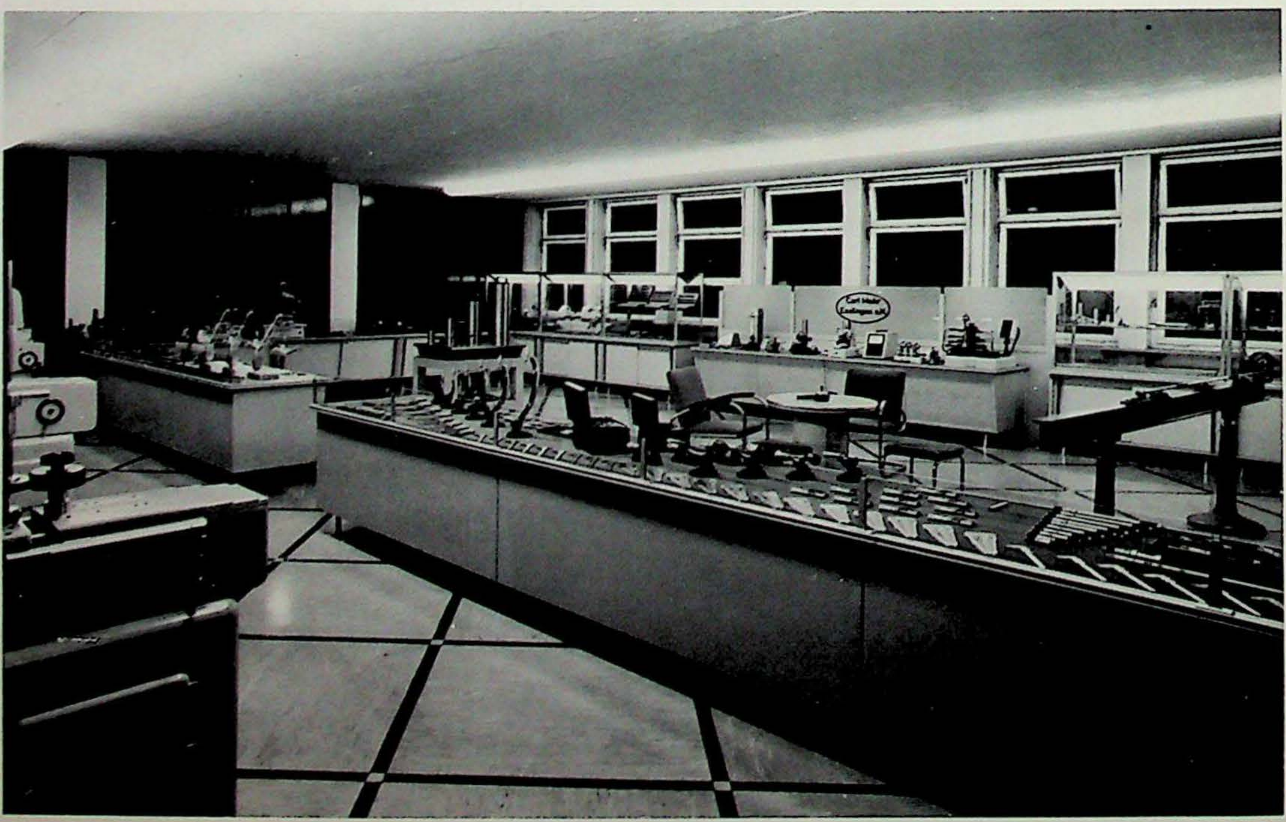
Requirements for extremely close tolerances can be readily met by interchangeable Comparator Heads which are used instead of Dial Indicators. MAHR super-sensitive Precision Comparators read directly in 20 millionths, 50 millionths, tenths or ½ thousandths of an inch. They are instantly interchangeable to meet required tolerance specifications. These comparators employ a lever principle for their amplifying mechanism. Measuring motion of spindle is transmitted by means of a precision ball rolling along a precision lapped, plane sapphire surface. They are completely shockproof.

For large inspection runs a further increase in measuring speed and accuracy is possible through the use of **electric comparator** heads. Electric limit contacts may be set to the tolerance limits. When the work is gaged off-size, plus or minus contacts are closed causing a light in the signal attachment to flash whether the work is over- or undersized. The inspector must only observe the lights which tell him instantly whether the work is within tolerances (green light), undersize (red light) or oversize (white light). In addition, the actual measurement may be read on the dial. Multi-position inspection with electric comparators is simple to set up and tremendously fast and accurate. All signal light attachments are provided with a second socket for control connections which make further automation possible.

SUMMARY:

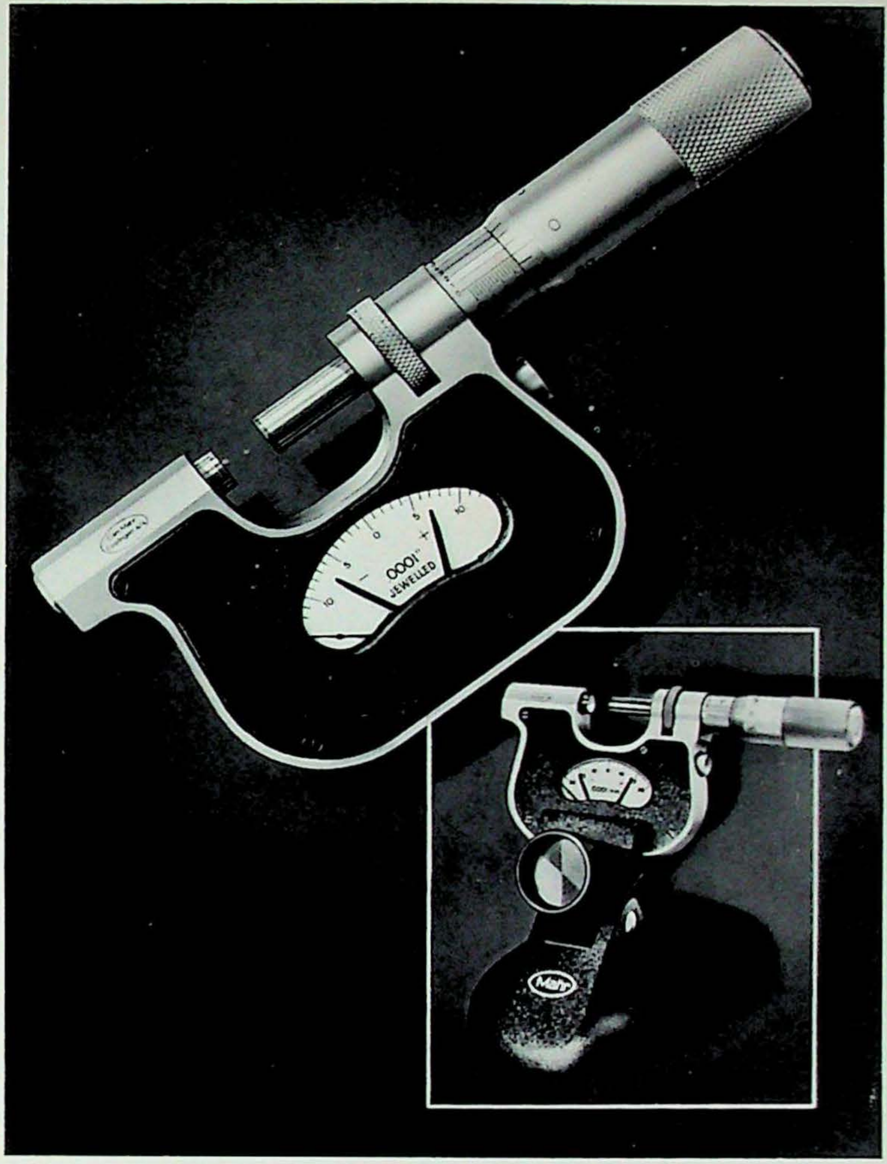
The use of MAHR indicating type gages results in considerable savings of time and money and minimizes the cost of inspection. The measuring result can be read in numerical values, and the personal measuring feel of the operator has no influence on the result, assuring much greater reliability. Comparator heads reading in fractions of tenths of thousandths may be readily interchanged, and within seconds the gages can be equipped to read in the desired tolerances.

The gages can be set to zero quickly, and their measuring surfaces are practically not subject to wear. And, because of the relatively wide measuring range of each gage size, a much smaller number of gages are needed to do the job.



Showroom at Factory

Mahr INDICATING MICROMETER - COMPARATOR



NO. 40 SF Indicating Micrometer-Comparator,

0-1" range, reading in tenths. Make Go and NoGo gaging obsolete. Reduce each measurement to **one** operation. Detect out-of-round and taper.

Fully jewelled, one piece stainless steel spindle and screw. Anvils are heavily tungsten carbide tipped. Forged steel frame.

Specifications:

No. 40 SF	0-1" measuring capacity, in finished hardwood case
No. 40 SF	metric, 0-25 mm measuring capacity, in finished hardwood case
No. 41 H	Micrometer Stand

For larger sizes of Indicating Micrometers refer to page 4.

COMPLETE
SERVICE
facilities in New York

Repair and Spare Parts in stock.

Every Shop Needs One

A comparator for inspection of mass produced parts, screw machine products, ground pieces etc. The micrometer spindle and tolerance hands may be set to the required size. The locknut is used to firmly clamp the spindle without altering the setting. The anvils are opened by pressing the button on the side of the frame, allowing the work to be inserted and withdrawn without friction.

Uniform pressure is maintained while measuring. The indicating mechanism controls the measuring pressure, eliminating all uncertainties due to difference in the "feel" of individuals. Out-of-round, oval, taper conditions can be determined by rotating or sliding the work between the anvils while observing the readings of the indicator with an accuracy of 1/10,000".

A Right Hand Tool

Release button for moveable anvil on right hand side enables operator to hold tool the conventional way. NEW — Resetting to ZERO in seconds. Quick adjustable tolerance hands.

Convenient

No. 41 H Micrometer Stand guards against body heat and frees both hands of operator.

Mahr INDICATING MICROMETER - COMPARATOR

LARGE SIZE Indicating Micrometers with removeable indicator are available up to 12" capacity.

No. 40 T Indicating Micrometer

furnished with removeable Precision Comparator "Millimess" No. **1003 Z**,* reading in .000050", range of dial ±.002". Micrometer head reading in .0001".

The anvils are opened by pressing the button on the side of the frame, allowing the work to be inserted and withdrawn without friction. Sizes larger than 2" are equipped with a lifting lever instead of the button.

Fully jewelled, one piece stainless steel spindle and screw. Anvils are heavily tungsten carbide tipped. Forged steel frame.

SPECIFICATIONS:

No. 40 T range **0"-1" 1"-2" 2"-4" 4"-6"**
6"-8" 8"-10" 10"-12"

All sizes are furnished in finished hardwood case and **include** setting standard.

No. 41 H Micrometer Stand optionally available.

METRIC sizes available.

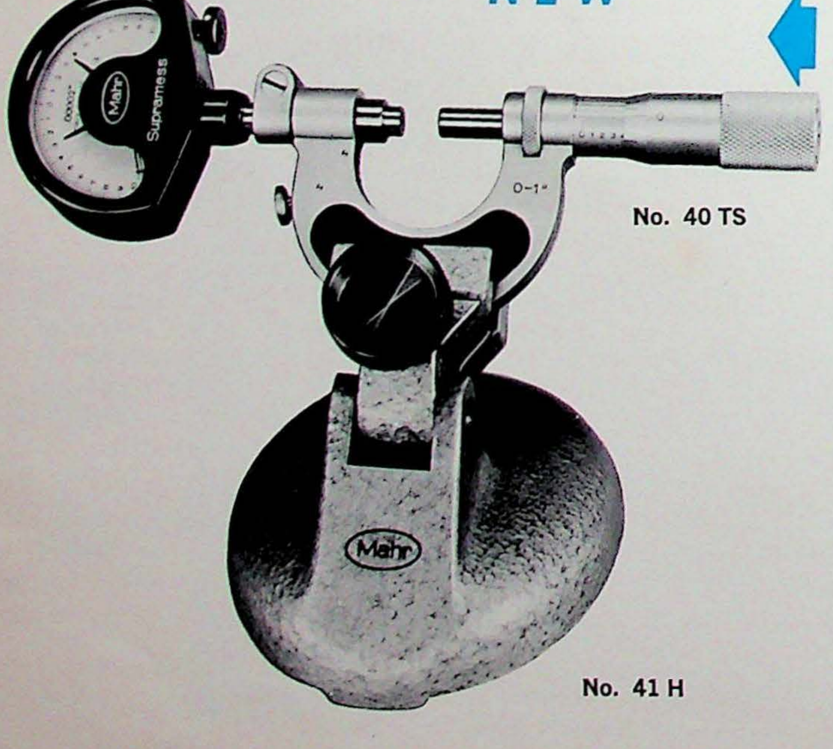
For thread measuring or special applications, these micrometers can be furnished with bores in anvil and spindle for inserting **interchangeable anvils. (see page 46). Use catalog No. 40 TZ.**

Thread Measuring Wires with Holders are available to be adapted to spindle and anvil of these micrometers. (Refer to page 62). Request information.

*On request, we can furnish all sizes of No. 40 T Indicating Micrometers with "Comprames' No. 500 Z Comparator, reading in .0001", range of dial ±.005", at no additional cost. Specify "with Compramess" in order.

No. 40 T
Millimess
Mahr

NEW



No. 40 TS

No. 41 H

No. 40 TS Super Indicating Micrometer

readings directly in 20 millionths of an inch.

furnished with removable Precision Comparator "Supramess" No. 1003 SZ, reading in .000020", range of dial ± .001". Micrometer head reading in .0001".

The anvils are opened by pressing the button on the side of the frame, allowing the work to be inserted and withdrawn without friction.

Fully jewelled, one piece stainless steel spindle and screw. Anvils are heavily tungsten carbide tipped. Forged steel frame.

SPECIFICATIONS:

No. **40 TS** range **0"-1" 1"-2"**

All sizes are furnished in finished hardwood case but **without** setting standard.

No. **41 H** Micrometer Stand optionally available.

METRIC sizes available.

COMPLETE
SERVICE
facilities in New York

Repair and Spare Parts in stock.

Mahr BENCH MICROMETER WITH INTERCHANGEABLE MEASURING ANVILS

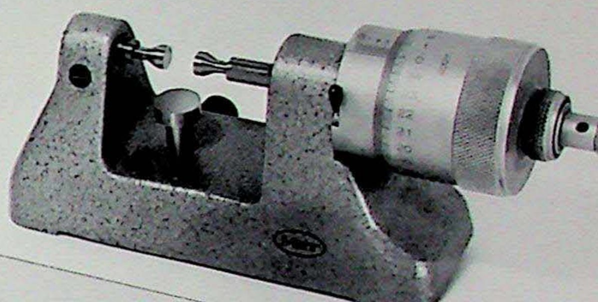
No. 40 H Precision Bench Micrometer

for small and difficult to measure parts. Measuring anvils are interchangeable. It features a heavy, stable base, thimble diameter of 1¾", throat depth of 1.280". The heavy micrometer head has a **NON-ROTATING** spindle and reads directly in .0001". A **lock screw** is provided to firmly clamp the spindle. An adjustable work table supports parts to be checked.

SPECIFICATIONS:

No. 40 H, 0"-1" range, reading directly in .0001". Price includes 1 set of anvils (select from diagram on bottom of this page, except tungsten carbide tipped anvils) and black hardwood case, which has spaces for all interchangeable anvils. Additional sets of anvils may be purchased extra.

METRIC available.


No. 40H

No. 40 HF Indicating Bench Micrometer

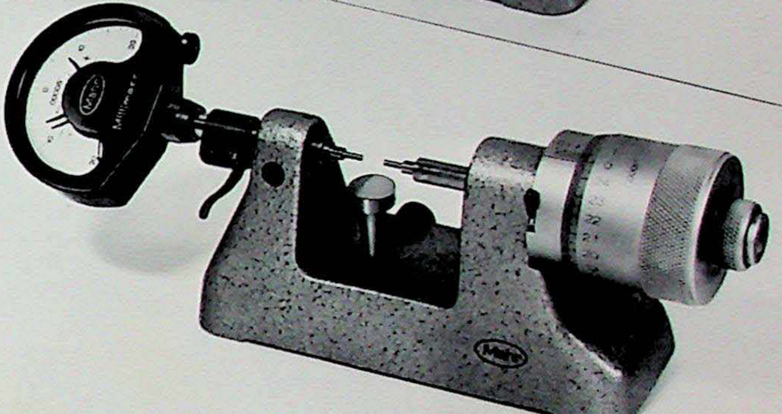
the ideal inspection aid for small and delicate parts for the toolmaking, instrument making, watch making and electronic field. Measuring anvils are interchangeable. Heavy stable base, thimble diameter of 1¾", throat depth of 1.280". The heavy micrometer head has a **NON-ROTATING** spindle and reads **directly** in .0001". A **lockscrew** is provided to firmly clamp the spindle. A convenient located lever permits rapid retraction of the anvil for inserting and withdrawing the work. Instant zero adjustment. Tolerance hands are outside of dial. An adjustable work table supports parts to be checked.

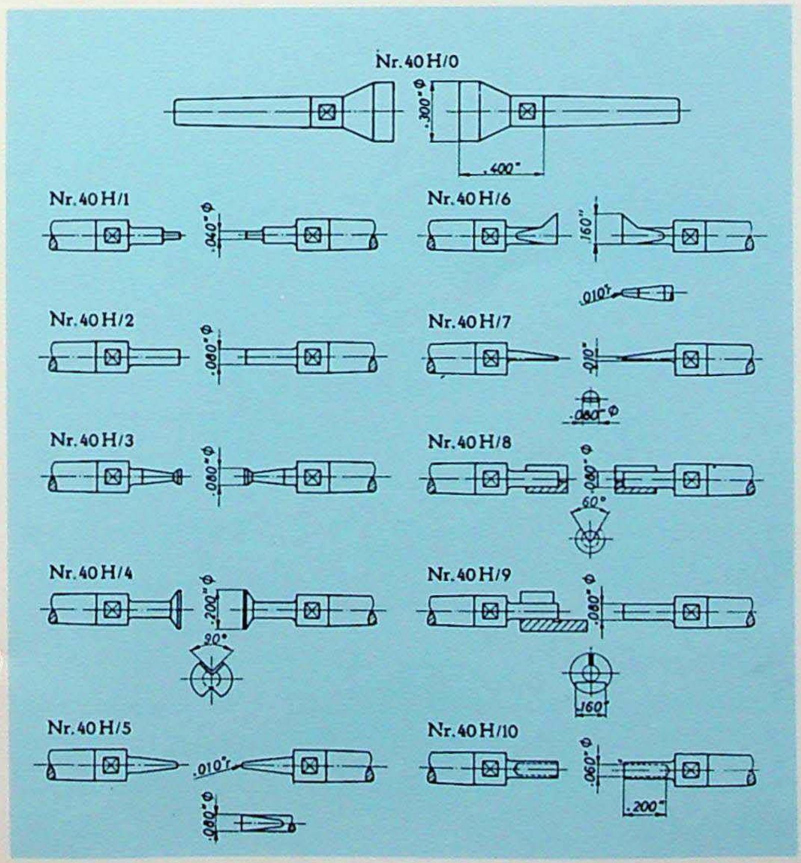
SPECIFICATIONS:

No. 40 HF, 0"-1" range
equipped with "Millimess" No. 1003 Z Comparator, reading in .000050"
or
equipped with "Supramess" No. 1003 SZ Comparator, reading in .000020".

Price includes 1 set of anvils (select from diagram on bottom of this page, except tungsten carbide anvils) and black hardwood case, which has spaces for all interchangeable anvils. Additional sets of anvils may be purchased extra.

METRIC available.


No. 40HF



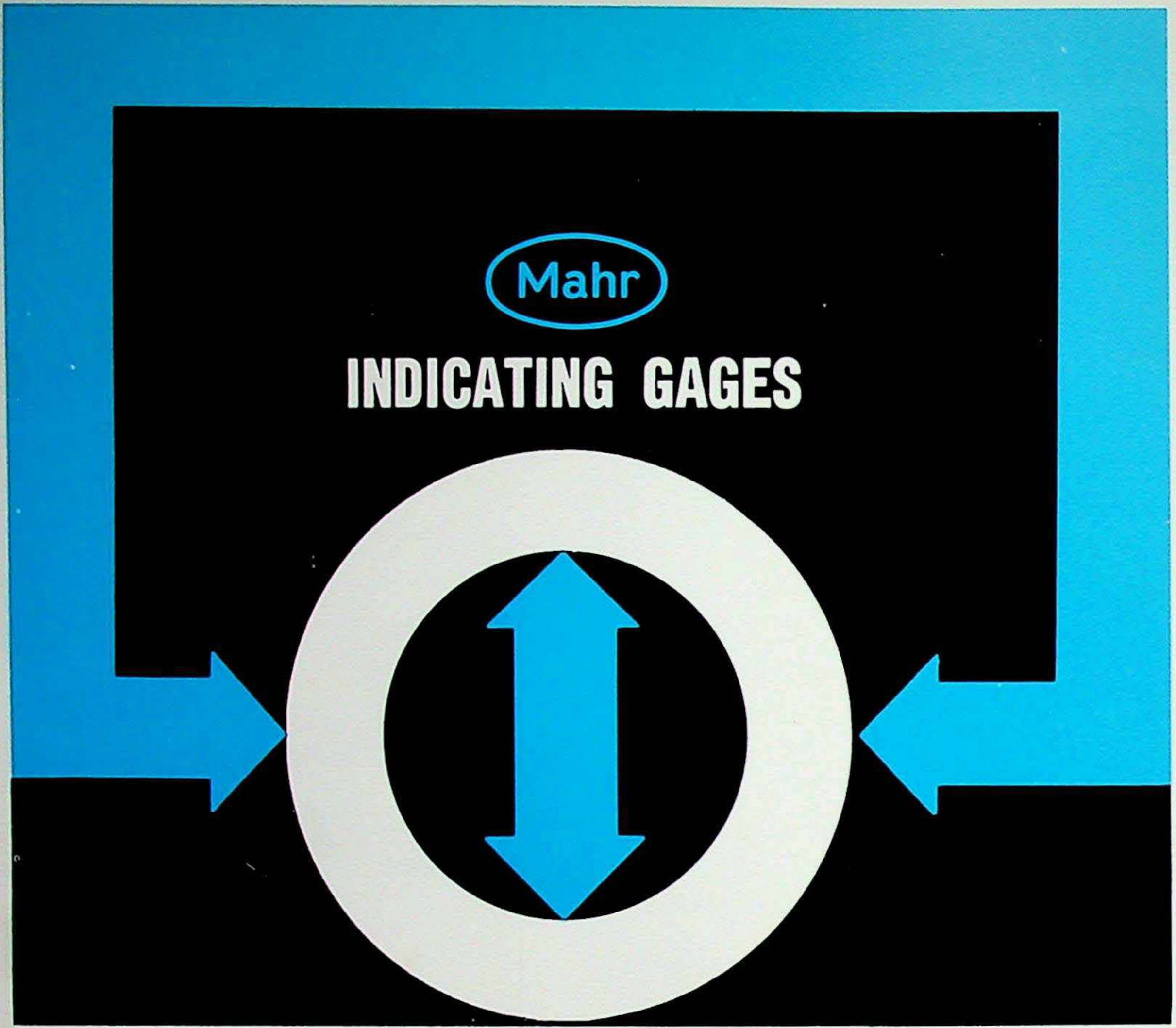
No. 40 H/0 — 10 Interchangeable Measuring Anvils

Spindle and anvil of the No. 40H Precision Bench Micrometer and the No. 40HF Indicating Bench Micrometer have conical bores which are holding the interchangeable measuring anvils firmly and precisely centered by their tapered shanks. Eleven pairs of anvils of various shapes are carried in stock from which a suitable form may be selected for the work to be checked.

Anvils No. 40 H/0, plane measuring faces .300" diameter
Anvils No. 40 H/1, plane pin anvil, .040" diameter
Anvils No. 40 H/2, plane pin anvil, .080" diameter
Anvils No. 40 H/3, disc shaped anvil, .080" diameter
Anvils No. 40 H/4, disc shaped anvil, with V-notch, .200" diameter
Anvils No. 40 H/5, blade anvil, .080" width
Anvils No. 40 H/6, off-set blade, .160" height
Anvils No. 40 H/7, off-set blade .080" width
Anvils No. 40 H/8, same as No. 40 H/2, with slip-on V-block bushings for supporting the part to be measured
Anvils No. 40 H/9, same as No. 40 H/2, with slip-on right angle work support
Anvils No. 40 H/10, with clearance bore, .200" bore depth, .060" bore diameter

Anvils No. 40H/0, No. 40H/1 and No. 40H/2 can be furnished with TUNGSTEN CARBIDE faces.

We recommend only small diameter size anvils for the above Bench Micrometers.



Mahr Indicating Gages

are the answer

to high speed measuring with maximum accuracy

because

- they permit measuring results expressed in dimensional values
- they enable use of control chart techniques
- their operation is independent of the measuring "feel" and pressure used by different persons
- they eliminate attribute inspection thus increasing speed of operation
- their measuring surfaces are practically not subject to wear
- they can be set to zero quickly

and

- because of their relatively wide measuring range of each gage size, fewer gages are needed to do the job.

Here are some typical examples:

Outside Diameter

Indicating Snap Gages, refer to pages	7 & 8
Indicating Snap Gages, Heavy type, refer to page	9

Inside Diameter

Selfcentering Bore Gages	34 to 38
Indicating Plug Gages	39

Thread Inspection

Indicating Thread Plug Gage	51
Roller Thread Comparator	50
Indicating Thread Snap Gage	48 & 49

Mahr INDICATING SNAP GAGE

No. 840 F Adjustable Indicating Snap Gage

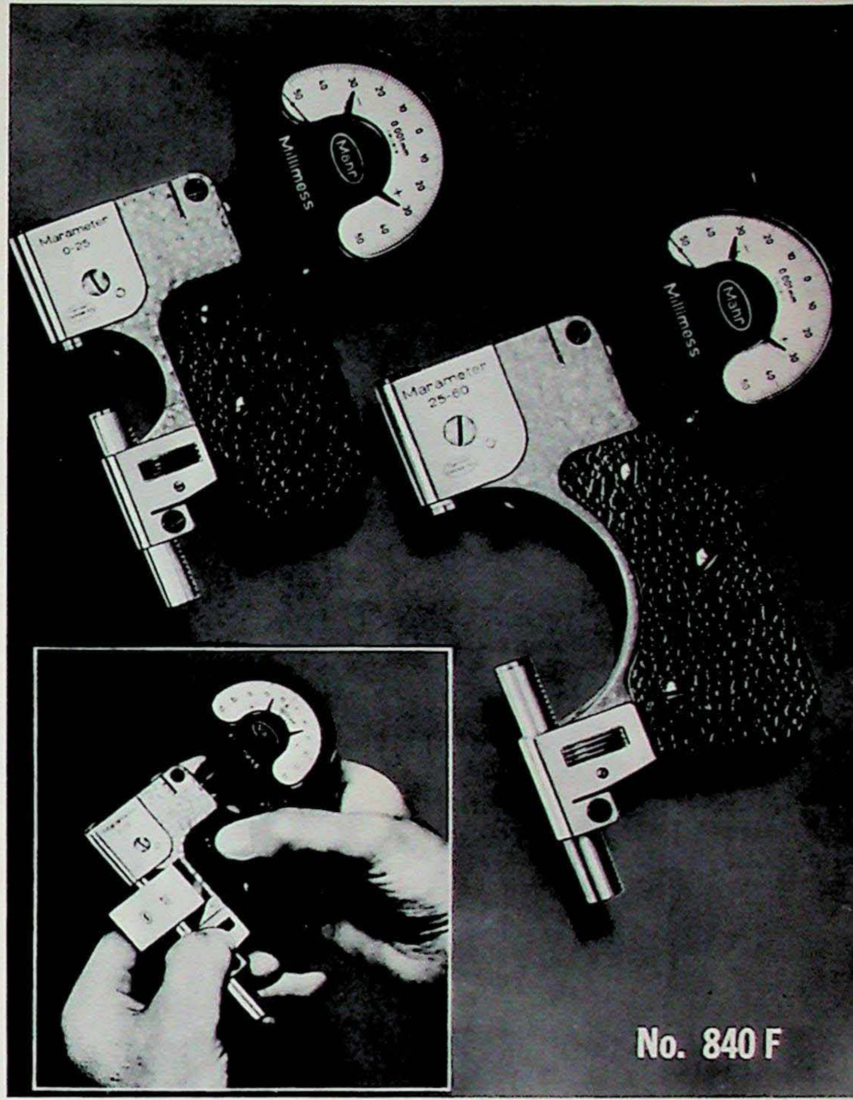
With super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or ½ thousandth of an inch.

MAHR Indicating Snap Gages eliminate operator's "feel." One may determine at a glance whether work is within tolerance limits. Just set the limit hands on the dial, retract the moveable anvil with one finger by means of lever on back of gage (see fig. 2), and release it. The dial will show the exact amount of material left to be removed.

A single MAHR Indicating Snap Gage replaces a whole set of fixed snap gages because the adjustable indicating snap gage has an extremely wide range. Five frames cover a range from **0″ to 8″**. These five MAHR Indicating Snap Gages replace a great number of fixed gages ordinarily needed to cover this range.

Here are some outstanding features of MAHR Indicating Snap Gages:

- Make Go and NoGo gaging obsolete
- Reduce each measurement to one operation
- Not subject to individual's touch or skill
- Tell within millionths how far work is from limit zone
- Detect out-of-round and taper
- Easy to set and operate



No. 840 F

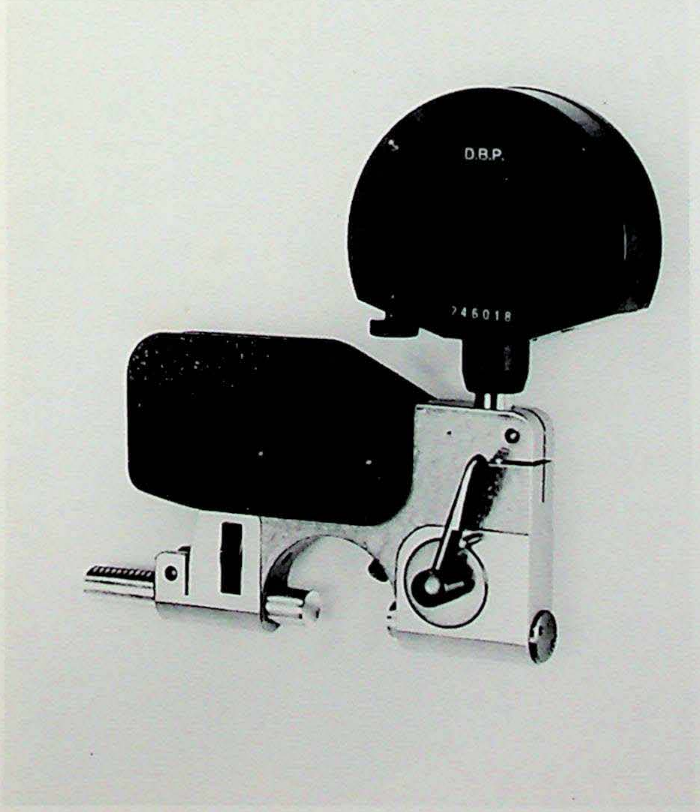


Fig. 2

CONSTRUCTION:

Drop forged steel frame with thermal insulating handles. Moveable spindle assures parallelism of measuring faces at all settings. Tungsten carbide tipped anvils. Observe convenient lever on back of frame (see fig. 2) for rapid retraction of moveable anvil. The absence of force minimizes wear of measuring surfaces and eliminates feel of operator. Ideal for work on cylindrical grinder. Adjustable tolerance hands. Adjustable back stop for correct diametrical location. Easy to set with gage blocks or plug gages.

MAHR super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or ½ thousandths of an inch are instantly interchangeable.

SPECIFICATIONS:

No. **840 F**, range **0″-1″ 1″-2⅜″ 2″-4″ 4″-6″ 6″-8″**

All sizes are furnished in black hardwood cases but without comparator gaging head.

Select interchangeable comparator gaging head from page 14 and 15. If desired for METRIC, select gaging head graduated in millimeters.

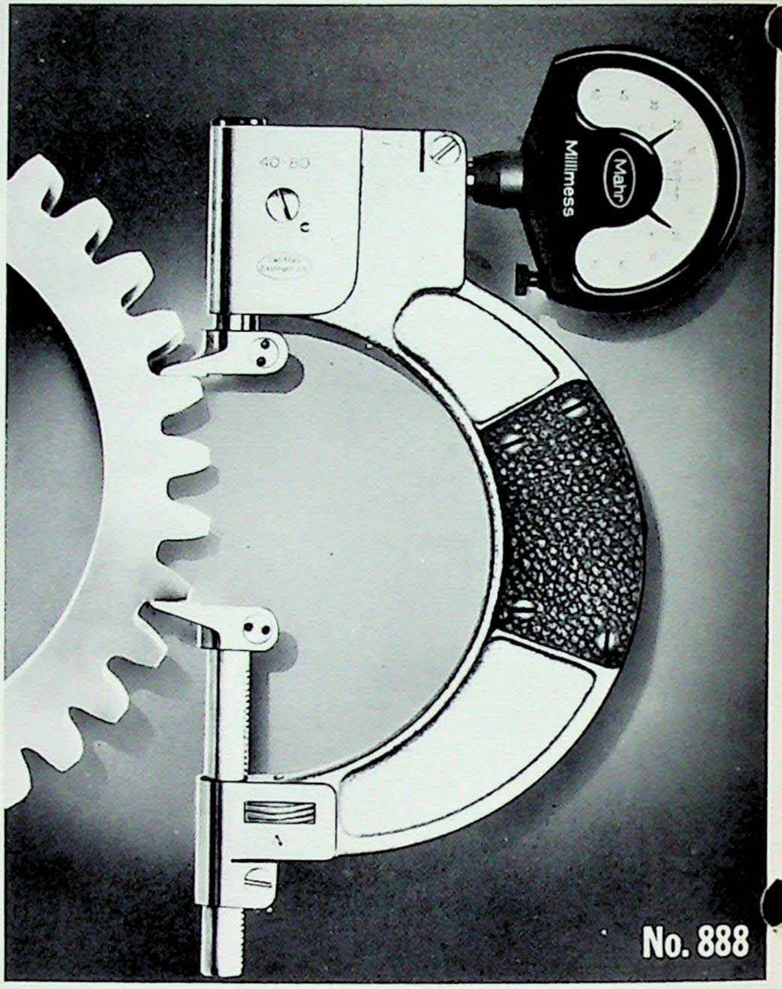
Indicating Snap Gages for the checking of threads, grooves, slots, recesses, key ways, splines and hard-to-measure surfaces are available with interchangeable measuring anvils. Refer to page 48-49.

Mahr INDICATING SNAP GAGE

No. 888 Adjustable Indicating Snap Gage

With super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or ½ thousandth of an inch.

Identical with No. 840F style, but with **fixed** anvils as illustrated, tungsten carbide tipped.



SPECIFICATIONS:

No. 888, range: 0″-1½″ 1½″-3″ 3″-5″ 5″-7″

All sizes are furnished in black hardwood cases but without comparator gaging heads.

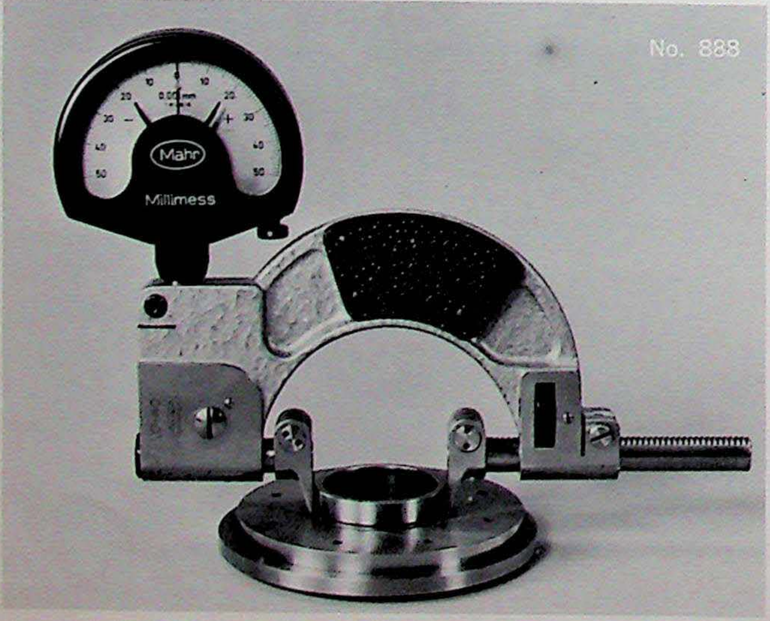
Select interchangeable comparator gaging head from page 14 and 15.

If desired for METRIC, select gaging head graduated in millimeters.

Depth of special measuring jaws from center of spindle to tip of measuring jaw as follows:

for ranges 0″-1½″ and 1½″-3″	.700″
for ranges 3″-5″ and 5″-7″	1.000″

The special measuring jaws can also be furnished extending frontward or backward, to order. They are **fixed** and cannot be adjusted except at factory.



CONSTRUCTION:

Here is an excellent comparator for the accurate checking of form tools, lands, centering beads, shallow hubs and especially for measurements of tooth thickness on spur gears and helical gears. The special measuring jaws extend downward and are tungsten carbide faced, precision ground and lapped and adjusted for maximum parallelism. The moveable anvil, responding to a retracting lever located on the back of the frame, transfers its movement to the comparator head and permits a measuring result independent of the measuring "feel" and pressure used by different persons.

COMPLETE
SERVICE
facilities in New York

Repair and Spare Parts in stock.

Mahr INDICATING SNAP GAGE

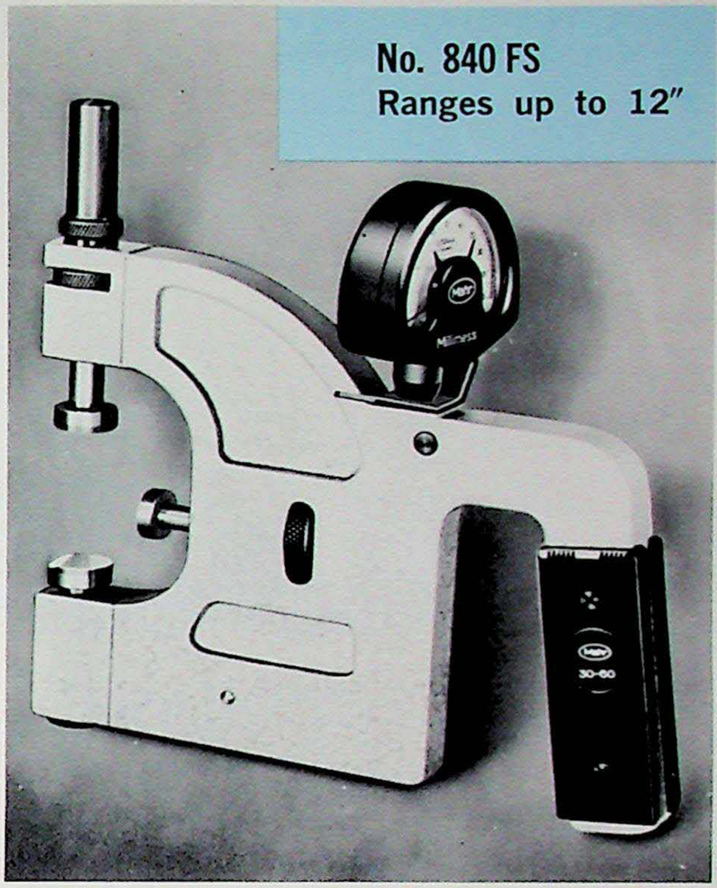
Heavy Duty

Indicating Snap Gage No. 840FS

of special sturdy and rigid construction

With super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or ½ thousandth of an inch.

with tungsten carbide tipped anvils,
plane and parallel, for measuring
close to shoulder.



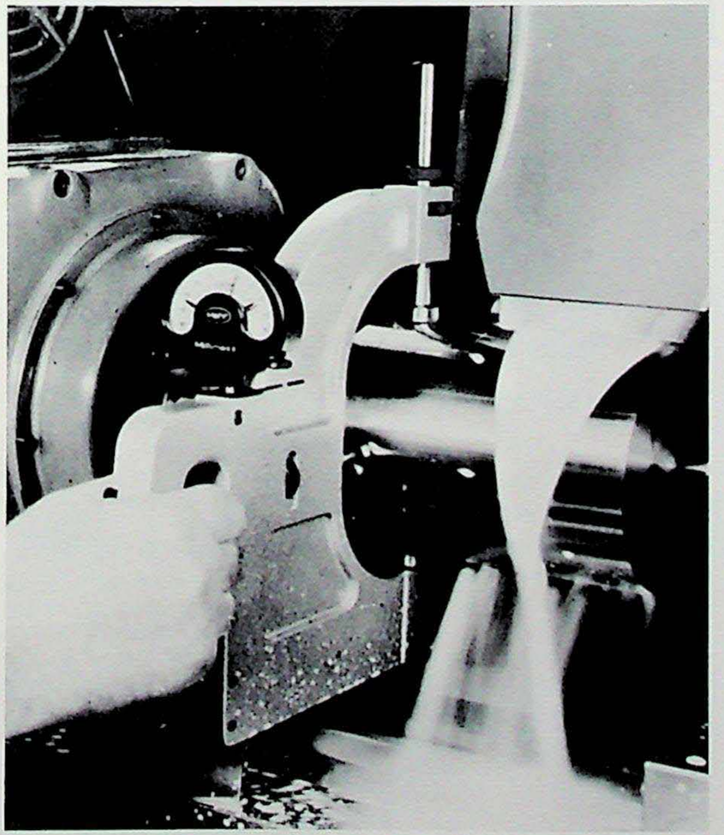
No. 840 FS
Ranges up to 12″

Specifications:

No. 840 FS, range ⅜″-1¼″ 1¼″-2⅜″ 2⅜″-4″
4″-6″ 6″-8″
8″-10″ 10″-12″

All sizes are furnished in black hardwood cases but without comparator gaging head.

Select interchangeable comparator gaging head from pages 14 and 15. If desired for METRIC, select gaging head graduated in millimeters.



Weight of this gage rests on fixed upper anvil so that it does not influence measurement.

CONSTRUCTION:

A great deal of strength is built into this gage. Ideal for gaging mass-produced parts at the machine. The rigid frame has an insulated handle, open at the lower end to protect from heat of hand. Guard plates protect precision comparator when placed on bench. The two stainless steel anvils have especially long guideways assuring perfect parallelism of anvil faces at every setting.

The anvil faces are tungsten carbide tipped and accurately plane and parallel. Thus correct measurements can be achieved even with the work not placed exactly in the center of the anvils. It also permits setting to standard gage blocks.

Front edges of anvils are sloped for easy insertion of work. The anvil faces extend somewhat beyond the width of the frame, permitting gaging close to shoulders or narrow ledges. Due to the wide anvil faces, the gage is automatically brought into the correct position square to the axis of the work. This is further assured by an adjustable back stop in the center of the frame.

A major advantage of this Snap Gage is that its weight rests on the fixed upper anvil so that it does not influence measurement. Adjustment of upper anvil is accomplished by knurled nut and can be locked in its setting. The moveable anvil built into the bottom of the frame transfers its movement frictionless to the precision comparator head. With the measuring pressure always constant, any influence of personal measuring feel is eliminated. Gaging is thereby guaranteed foolproof at all times.

Mahr UNIVERSAL TEST INDICATOR "PUPPITAST"

NEW "PUPPITAST" No. 800 SZ UNIVERSAL TEST INDICATOR

Contact Point at right angle to dial moves in an arc of 210°

READING IN .0005"

Corrosion Resistant — SATIN CHROME BODY

Highest accuracy and repeatability

Automatic Shiftless Reversing

The measuring direction is automatically reversible. It permits measuring in both directions, namely upward and downward. The rotation of pointer is always clockwise regardless whether contact point is moved upward or downward. This eliminates reading errors of plus and minus deviations due to confusion over movement.

Radically New Rigid Mounting

(U.S. Patent No. 3268197) on rear or underside of the housing. Mounting shaft is moved over a dovetail guide bar. It can be clamped absolutely tight in any desired position by a conveniently located knurled nut — without the aid of a screw driver or other tool.

High Measuring Accuracy

Due to frictionless running of the movement in combined ball and jewel bearings.

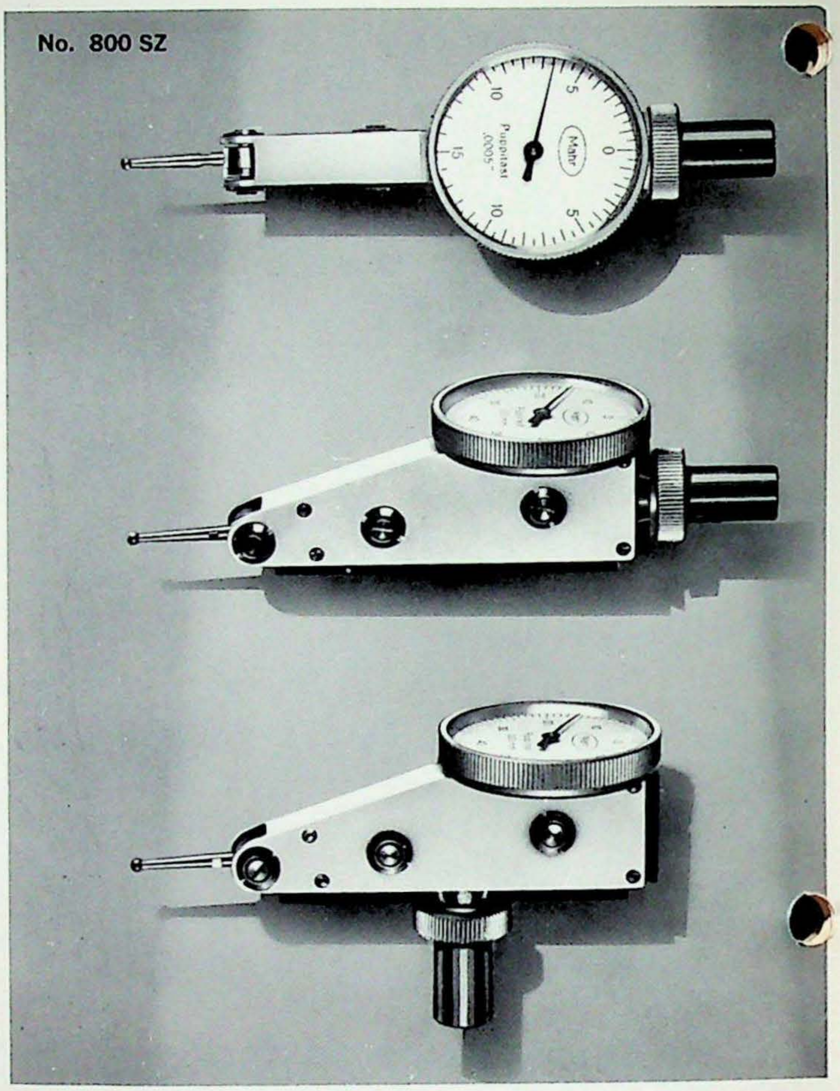
Favorable Shape

Due to the asymmetrical location of the contact point at the low end of the housing, measuring at hard-to-get-at or low lying places is made possible.

Specifications:

No. 800 SZ	Graduation	.0005"
	Measuring range	.030"
	Measuring pressure	1 oz.
	Dial Diameter	1⅛"
	Length of contact point	.515"

including 2 mounting shafts (fig. 4 & 5 on page 11) and adaptor bushing (fig. 6) in plastic case.

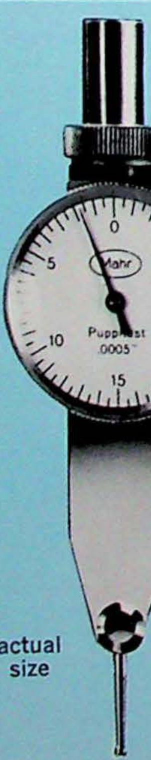

No. 800 SZ

No. 800 WZ

Reading in .0005"

Contact point moving horizontally parallel to dial, left and right.

Graduation	.0005"
Measuring range	.030"
Dial diameter	1⅛"
Measuring pressure	1 oz.
Length of contact point	.515"


No. 800 WZ

actual size

fig. 8

No. 800 SLZ

Reading in .0005"

Approx. 1⅝" long Contact point

Graduation	.0005"
Measuring range	.030"
Dial diameter	1⅛"
Measuring pressure	1 oz.
Length of contact point	1⅝"

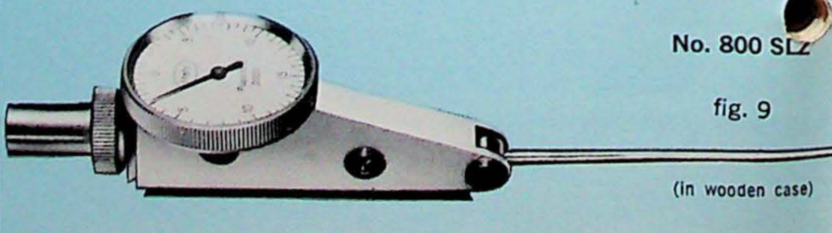
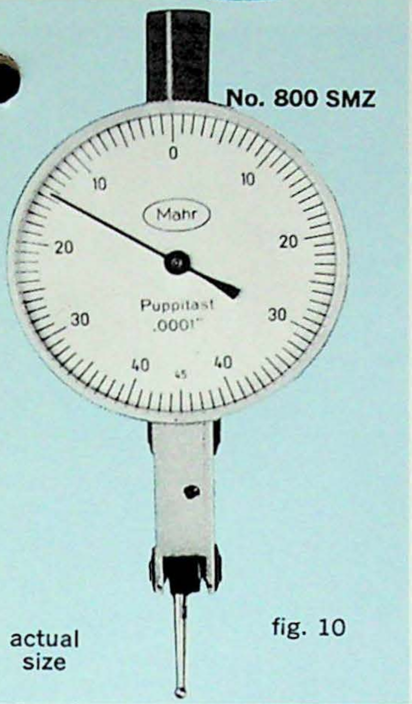

No. 800 SLZ

fig. 9

(in wooden case)

Mahr UNIVERSAL TEST INDICATOR "PUPPITAST"



actual size

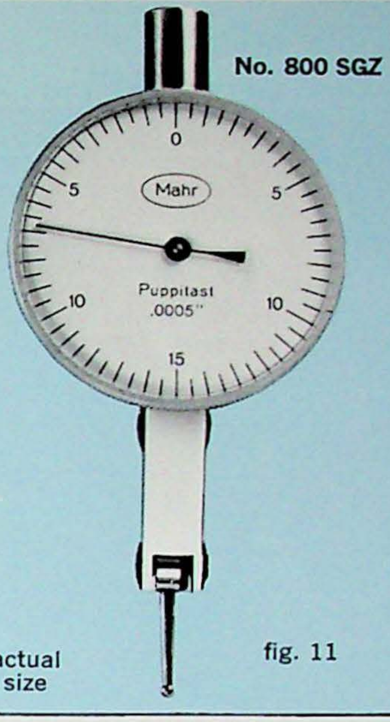
fig. 10

No. 800 SMZ

Reading in .0001″

Extra Large Dial

Graduations	.0001″
Measuring range	.0090″
Dial diameter	1$\frac{9}{16}$″
Measuring pressure	1½ oz.
Length of contact point	.515″



actual size

fig. 11

No. 800 SGZ

Reading in .0005″

Extra Large Dial

Graduation	.0005″
Measuring range	.030″
Dial diameter	1$\frac{9}{16}$″
Measuring pressure	1 oz.
Length of contact point	.515″

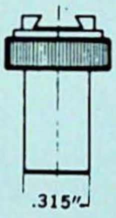


Fig. 4

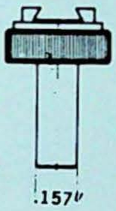


Fig. 5

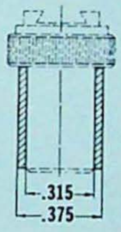
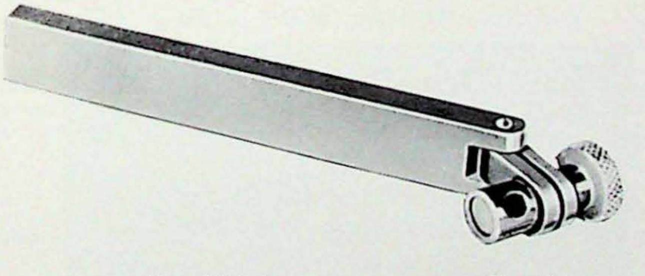


Fig. 6



No. 800 h

Fig. 7

Standard Equipment

for all 5 models includes 2 mounting shafts (as illustrated, see fig. 4 & 5) .157″ and .315″ dia. and adapter bushing .375″ for AGD (fig. 6) in unbreakable plastic case, which provides space for the No. 800 h Universal Holder.

METRIC graduation available.

Optional Accessories

Universal Holder No. 800 h (fig. 7) with swivel joint for mounting Puppitast Indicator. Length 3⅜″ · cross section ¼″ x ½″.

Contact Points

have a screw base and are readily interchangeable. The .080″ contact point is furnished as standard equipment.

Hardened Steel Point	.515″	long	.040″	ball dia.
Hardened Steel Point	.515″	long	.080″	ball dia.
Hardened Steel Point	.515″	long	.120″	ball dia.
Hardened Steel Point	1⅝″	long	.080″	ball dia.
Tungsten Carbide Point	.515″	long	.040″	ball dia.
Tungsten Carbide Point	.515″	long	.080″	ball dia.
Ruby Tipped Point	.515″	long	.080″	ball dia.

No. 800 hv Mounting Fixture

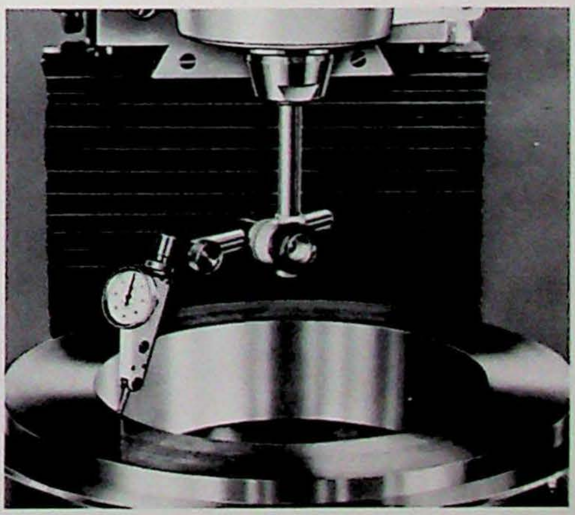
Consisting of 2 columns for the mounting of "Puppitast" Universal Test Indicators as well as Mahr Dial Indicators and Precision Comparators.

For measuring, locating and centering of work pieces on machine tools. Two swivel joints permit either column to be moved in circular direction. A threaded shank on the main column permits attaching of the fixture on machine tools and measuring fixtures.

Specifications: **No. 800 hv**

Length of main column	6.300″
Diameter of main column	.440″
Length of column holding indicator	4″
Mounting bore for indicator	.315″

Mounting clamp for indicator can be swivelled within 180°.



Mahr SHOCKPROOF DIAL INDICATORS

No. 811 ST Shockproof Dial Indicators

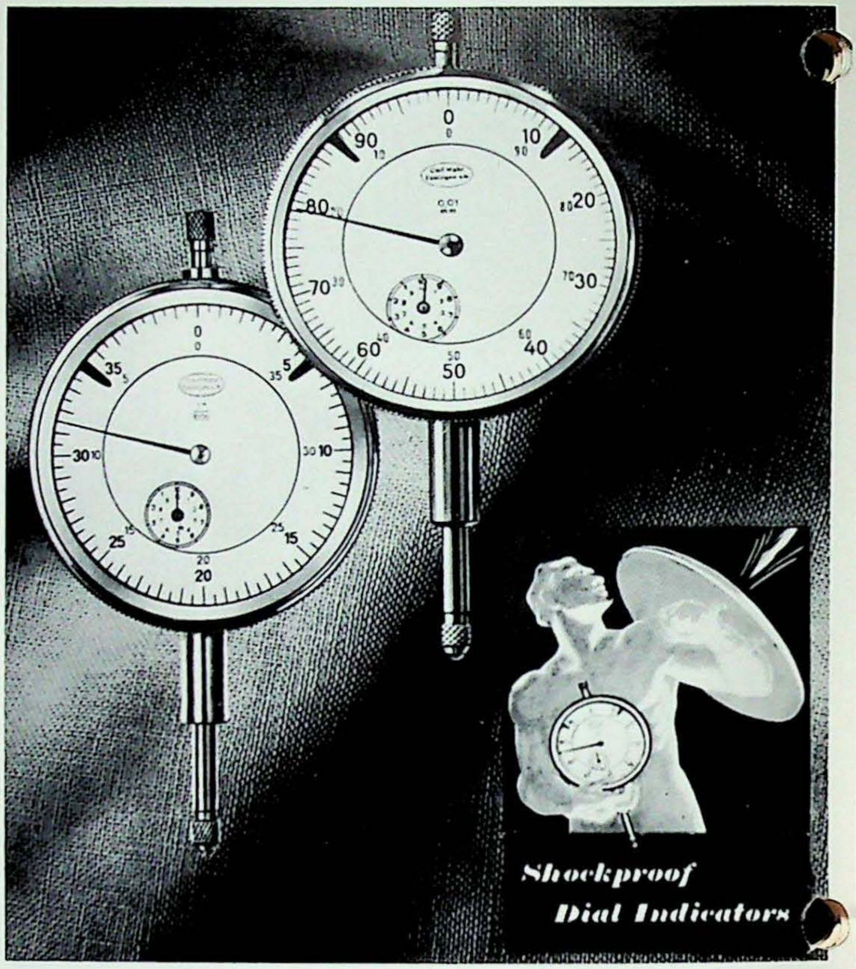
ALL STEEL construction. Spindle and mounting shaft are made of stainless, hardened steel. Our unique design, illustrated on bottom of this page, makes our indicators completely shockproof and insures long life with unchanging accuracy. Equalizing lever assures uniform measuring pressure over the entire range.

One revolution of the large hand of the No. 811ST corresponds to .040″. The dial is divided into 40 parts. The long lines indicate .001″; by a subdivision .0005″ can be read directly and still smaller values can be estimated. The second small dial hand counts the revolutions of the big hand. The measuring range is .400″.

The Dial Indicators are furnished with a cable release, for which a threaded opening is provided at right bottom in the housing. This opening is plugged by a screw to prevent penetration of dust and moisture, when cable release is not in use.

A plastic splash guard is furnished as standard accessory. This front cover is made of transparent, unbreakable plastic. It prevents drip water, oil and dirt from entering and protects window and bezel against physical damage.

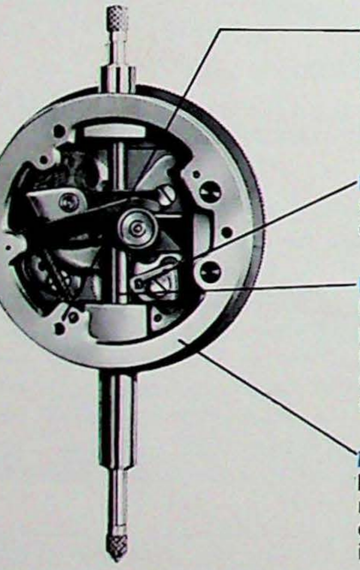
These indicators are ideal for O.E.M. use.



0
10
20
30
40
50
60
70
80
90
0.01
0
5
10
15
20
25
30
35

Shockproof Dial Indicators

Construction of Dial Indicator No. 810/811 ST and its most important features:



Switch Lever permits setting of measuring pressure to 65 gram = $2\frac{1}{2}$ oz. or 100 gram = $3\frac{1}{2}$ oz.

Floating rack sleeve shields mechanism from even the heaviest shocks.

Lapped gear rack **of hardened steel and precision gearing in mechanism** guarantee constant high measuring accuracy.

Dull Chromed **steel housing one-piece with mounting shaft** make the dial indicator durable and insensitive.

Specifications:		
	No. 811 ST	reading in .0005″ measuring range **.400″**
	No. 810 ST	reading in 1/100 mm measuring range **10 mm**
	dial diameter $2\frac{1}{4}$″	shank diameter .315″

With adjustable tolerance markers.

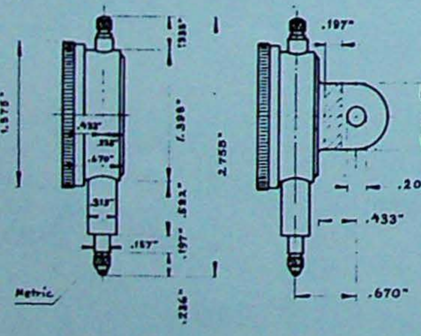
Furnished in clear plastic case with ME 1 standard ball contact tip, cable release for lifting of feeler point by remote control, with plastic splash guard and $\frac{3}{8}$″ bushing for AGD. The indicator has a flat back.

Center Lug Backs optionally available.

Straight and angular holders No. 813 H for special mounting of Dial Indicators, refer to page 15.

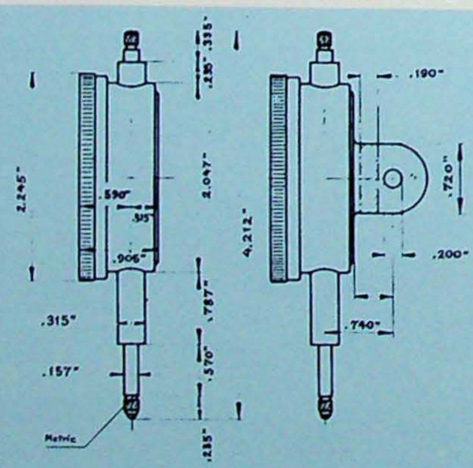
Contact Points have a threaded base and are interchangeable. Refer to page 15 for **Standard and other available contact points.**

Principal Dimensions:



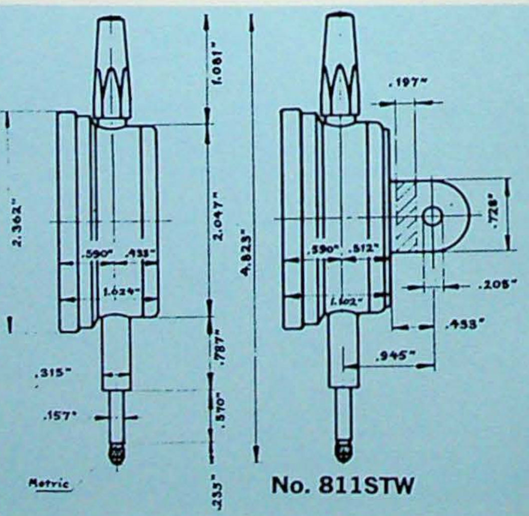
1.575"
.432"
.315"
.670"
.315"
.157"
.335"
1.398"
.591"
.197"
.236"
2.755"
Metric
.197"
.728"
.205"
.433"
.670"

No. 803ST



2.245"
.590"
.315
.906"
.315"
.157"
.235" .335"
2.047"
.787"
.570"
.235"
4.212"
Metric
.190"
.720"
.200"
.740"

No. 811ST



2.362"
.590"
.433"
1.624"
.315"
.157"
1.081"
2.047"
.787"
.570"
.233"
4.823"
Metric
.197"
.728"
.590"
.512"
1.602"
.205"
.433"
.945"

No. 811STW

Mahr WATERPROOF & SHOCKPROOF DIAL INDICATORS

No. 803 STZ Shockproof Small Dial Indicators

They are most convenient and light in weight and of highest accuracy. Particularly suitable for small measuring instruments. Shockproof mechanism protects the gear train from damage when jolting the spindle.

Sturdy housing assures stable position of mechanism and mounting shaft. Spindle and mounting shaft are made of **stainless, hardened steel.**

One revolution of the pointer corresponds to .020". The dial is divided into 40 parts. The long division lines indicate .001", the short one .0005". Total measuring range is .120".

These indicators are ideal for O.E.M. use.

Specifications:

No. 803STZ reading in .0005"
measuring range .120"
with adjustable tolerance markers
No. 803ST reading in 1/100 mm
measuring range 3 mm
with adjustable tolerance markers
} dial dia. 1$\frac{9}{16}$"
shank dia. .315"

Furnished in clear plastic case with ME 1 standard ball contact tip, with $\frac{3}{8}$" bushing for AGD. The indicator has a flat back. Center Lug Back optionally available.

The above Small Dial Indicators can now be furnished **drip-waterproof and shockproof.** A removable protective cap at the upper end of the spindle, as well as a transparent cover placed over the bezel, safeguard the dial indicator from penetration of dripwater, prolonging life of instrument.

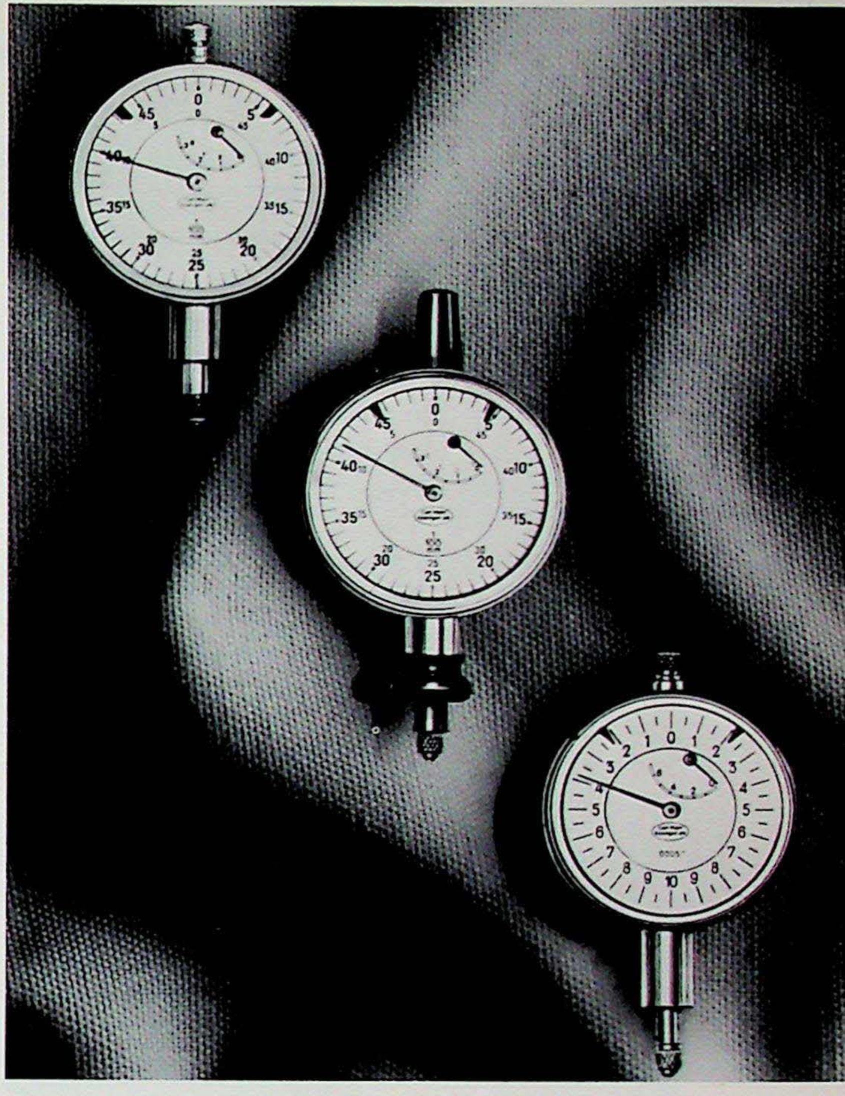
Specifications:

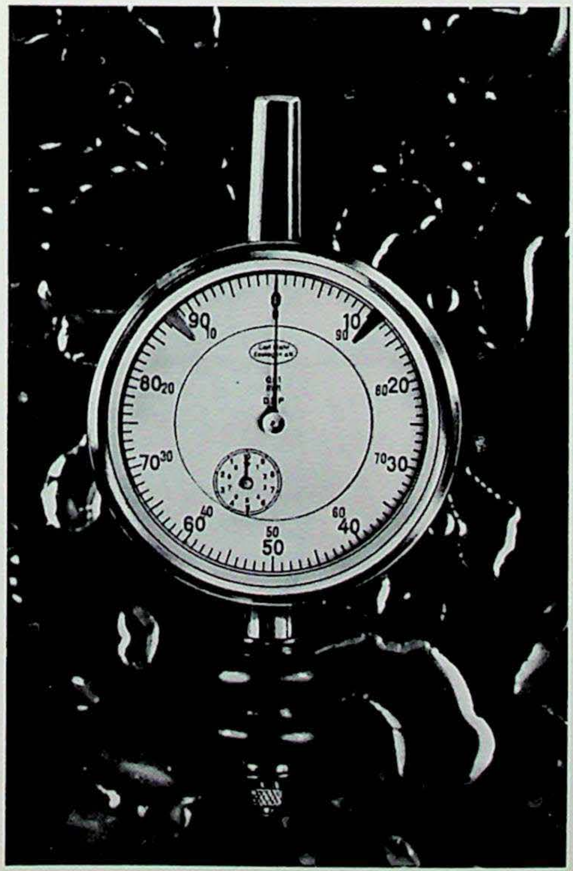
No. 803STWZ reading in .0005"
measuring range .120"
with adjustable tolerance markers
No. 803STW reading in 1/100 mm
measuring range 3 mm
with adjustable tolerance markers
} dial dia. 1$\frac{9}{16}$"
shank dia. .315"

Furnished in clear plastic case with ME 1 standard ball contact tip, with $\frac{3}{8}$" bushing for AGD. The indicator has a flat back. Center Lug Back optionally available.

Extra Contact Points, refer to page 15.

No. 803ST No. 803STW No. 803STZ





No. 811 STW Water and Oilproof, Shockproof Dial Indicator

This model is basically the same indicator as our No. 811ST (on page 12) but has **water-tight construction.** Absolutely protected against the entrance of moisture and dirt, this indicator can be used where it is exposed to cutting fluids and abrasive dust.

Like all other MAHR Dial Indicators, it is **SHOCK-PROOF.** Satin chrome finish protects the case against corrosion. Measuring spindle and shank are made of stainless steel.

This model does not have a cable release.

NEW: Fine adjustment on this model is made by turning the knurled knob of stem cap. Zero always remains at 12 o'clock position. Tolerance hands are adjustable.

Specifications:

No. 811STW reading in .0005"
total range .400"
No. 810STW reading in 1/100 mm
total range 10 mm
} dial diameter 2$\frac{1}{4}$"
shank diameter .315"

Furnished in clear plastic case with ME 1 standard ball contact tip with $\frac{3}{8}$" bushing for AGD. The indicator has a flat back.

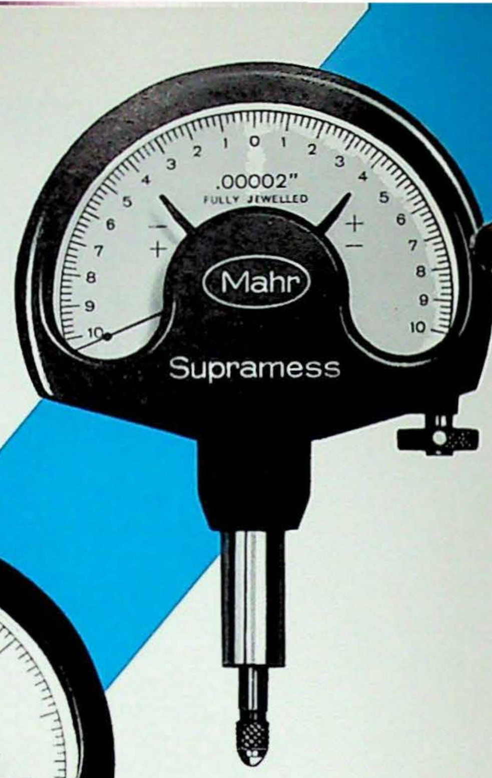
Center Lug Back optionally available.

Extra Contact Points, refer to page 15.

Request Repair Parts List with prices

Mahr PRECISION COMPARATORS

Reading directly in



SUPRAMESS No. 1003SZ

Graduations	.000020"
Range of total scale	±.001"
Width of single division	.045"
Accuracy of total scale	±.000010"
Overtravel	.110"
Measuring Pressure	3½ oz.
Weight	3½ oz.

20 MILLIONTHS

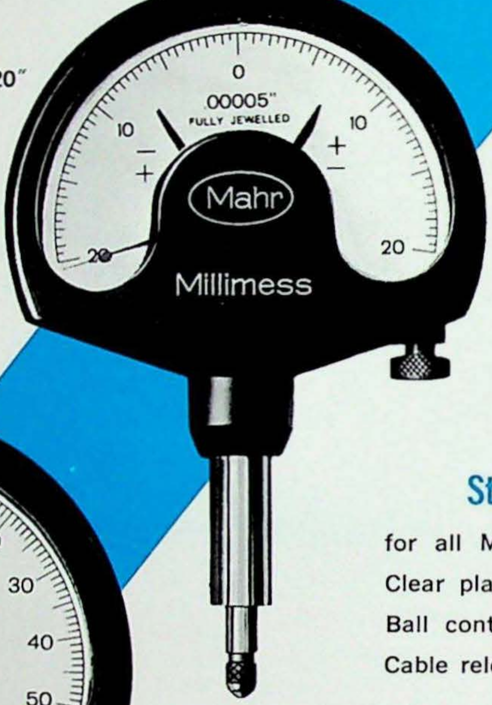
Range of Dial ± .001"

Accuracy over entire range ± .000010"

Fully Jewelled,

furnished with ruby ball contact tip

METRIC graduations available, reading in .5 μm.



MILLIMESS No. 1003Z

Graduations	.000050"
Range of total scale	±.002"
Width of single division	.045"
Accuracy of total scale	±.000020"
Overtravel	.110"
Measuring Pressure	3½ oz.
Weight	3½ oz.

50 MILLIONTHS

Range of Dial ± .002"

Accuracy over entire range ± .000020"

Fully Jewelled,

furnished with steel ball contact tip

METRIC graduations available, reading in .001 mm.

Standard Equipment

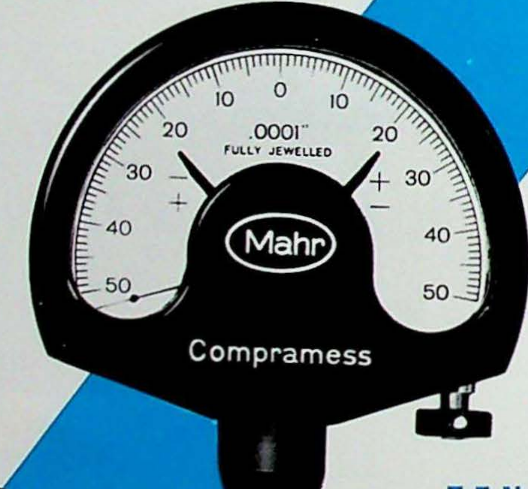
for all MAHR Precision Comparators:

Clear plastic case (for storing)

Ball contact tip (as specified)

Cable release (for lifting of feeler point by remote control)

⅜" bushing (for AGD)



TENTHS

Range of Dial ± .005"

Accuracy over entire range ± .0001"

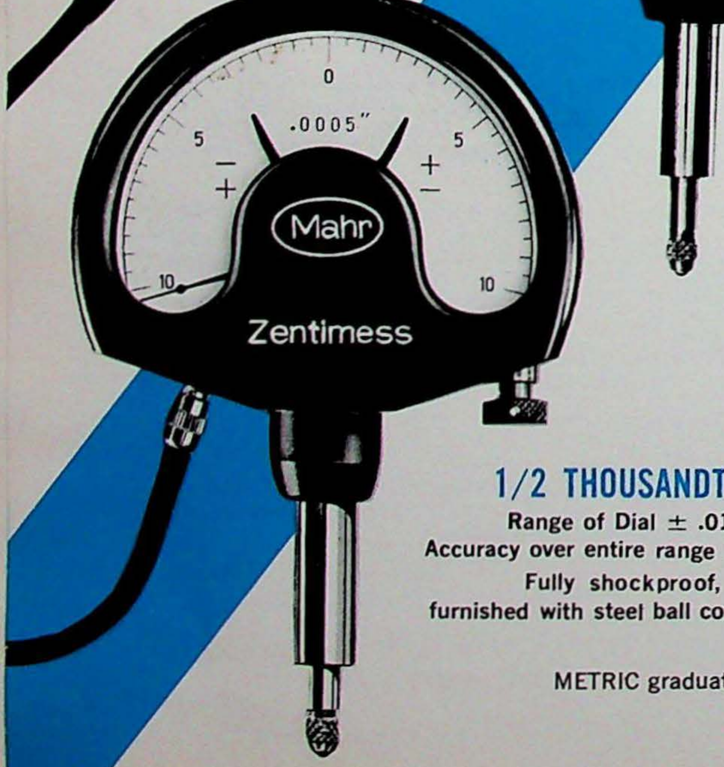
Fully Jewelled

furnished with steel ball contact tip

COMPRAMESS No. 500 Z

Graduations	.0001"
Range of total scale	± .005"
Width of single division	.036"
Accuracy of total scale	± .0001"
Overtravel	.100"
Measuring pressure	3½ oz.
Weight	3½ oz.

METRIC graduations available, reading in .005 mm.



1/2 THOUSANDTHS

Range of Dial ± .010"

Accuracy over entire range ± .0002"

Fully shockproof,

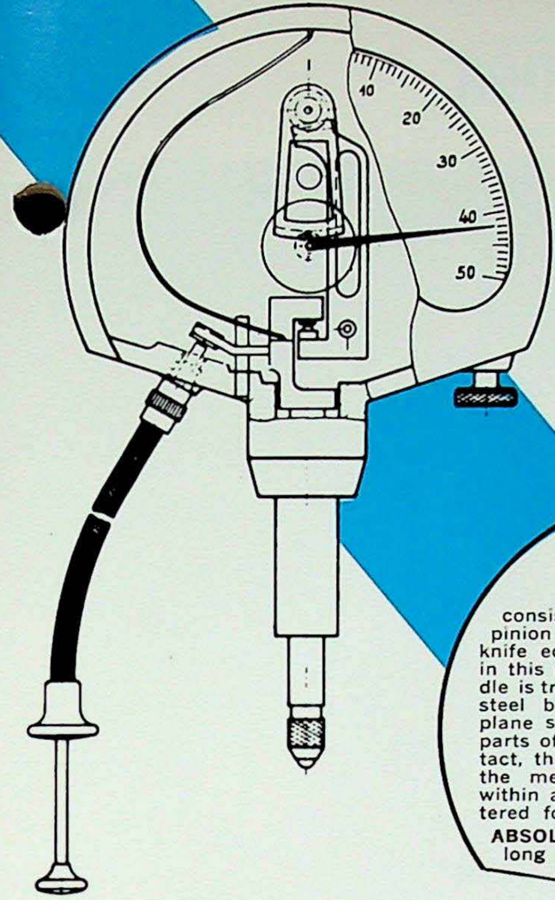
furnished with steel ball contact tip

ZENTIMESS No. 100Z

Graduations	.0005"
Range of total scale	±.010"
Width of single division	.090"
Accuracy of total scale	±.0002"
Overtravel	.100"
Measuring Pressure	3½ oz.
Weight	3½ oz.

METRIC graduations available, reading in .01 mm.

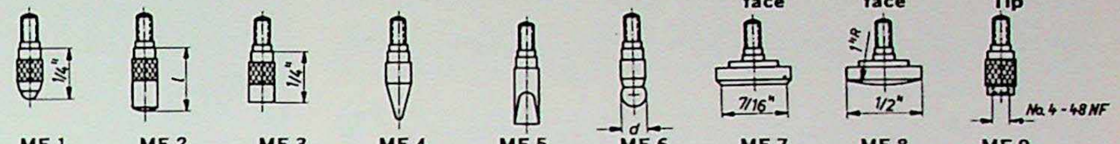
Mahr PRECISION COMPARATORS



Contact Points

have a threaded base (2.6 mm) and are interchangeable. Here is a variety of available contact points:

Standard	Extension	Plane	Pointed	Blade	Ball Point	Plane measuring face	Spherical measuring face	Intermediate Contact Tip
ME 1	ME 2	ME 3	ME 4	ME 5	ME 6	ME 7	ME 8	ME 9

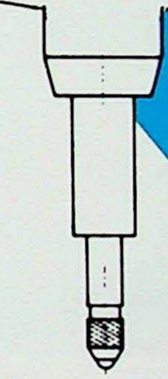


The intermediate contact tip ME 9 has mm thread on one side and 4-48 NF on other side, for mounting AGD-contact tips. ME 1 is optionally available with ruby ball instead of steel ball. Specify LENGTH when ordering ME2 and ME3.

Special Features
THE AMPLIFYING MECHANISM

consists of a lever, a gear segment, a pinion and a pointer. The unreliable knife edge suspension has been avoided in this design. Measuring motion of spindle is transmitted by means of a precision steel ball rolling over a highly lapped plane sapphire surface. Since all moving parts of the linkage are in preloaded contact, there is no play or back lash. Thus the measuring accuracy is maintained within a fraction of one graduation, unaltered for the lifetime of the instrument.

ABSOLUTELY SHOCKPROOF insuring long life with unchanging accuracy.



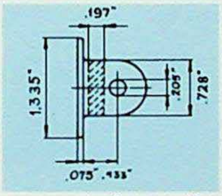
Optional Accessories for MAHR Precision Comparators:

- Center Lug Back
- Plastic Splash Guard
- Drip-Water Proof Construction
- Ruby Ball Contact Tip
- Turn knob for raising of measuring spindle instead of cable release
- Rubber Boot for protecting spindle against water and dust

Optionally Available

If the mounting of the Comparator on its shank is not desired, we can furnish a

CENTER LUG BACK



which may be cemented on the flat back of the Precision Comparator. In the same manner, any standard AGD-Indicator back can readily be fastened to MAHR Precision Comparator.

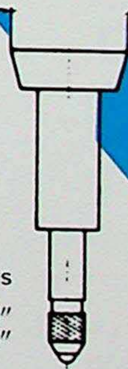
Special Features

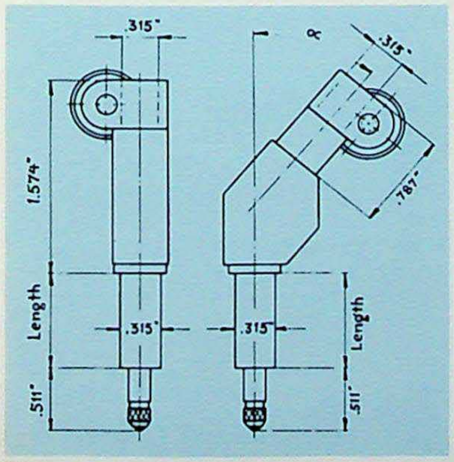
OVERTRAVEL of approx. .110" beyond scale range, permitting measuring of grooves, etc., and preventing damage to instrument.

CABLE RELEASE. The feeler point is lifted by means of a cable release which protects the comparator from heat of hand, unequal pressure and vibration.

FINE ADJUSTMENT of the hand is possible over the entire range when the measuring spindle is under pressure.

TOLERANCE HANDS. Two tolerance hands instantly adjustable to any decided plus and minus tolerances.





No. 813H Special Holder

for Precision Comparators and Dial Indicators

Diameter of mounting shank	.315"
Maximum travel of measuring spindle	.120"

Most practical for mounting of Indicators for special gaging applications. Available as follows:

No. 813Hg Straight Holders
No. 813Hw Angular Holders

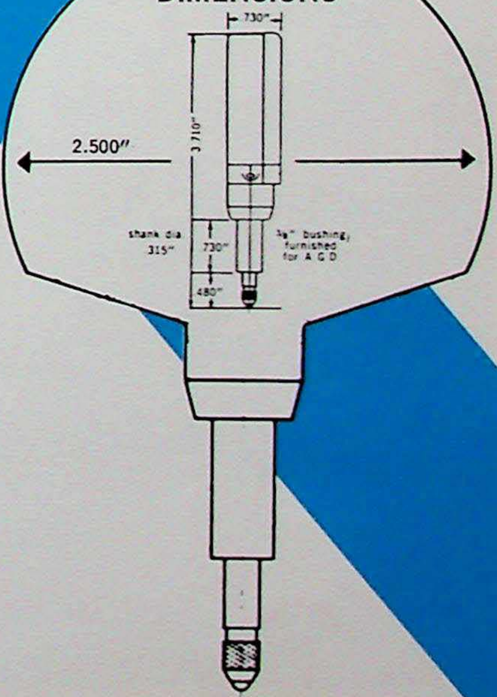
ME 1 is furnished as standard contact point.

Other contact points optionally available.

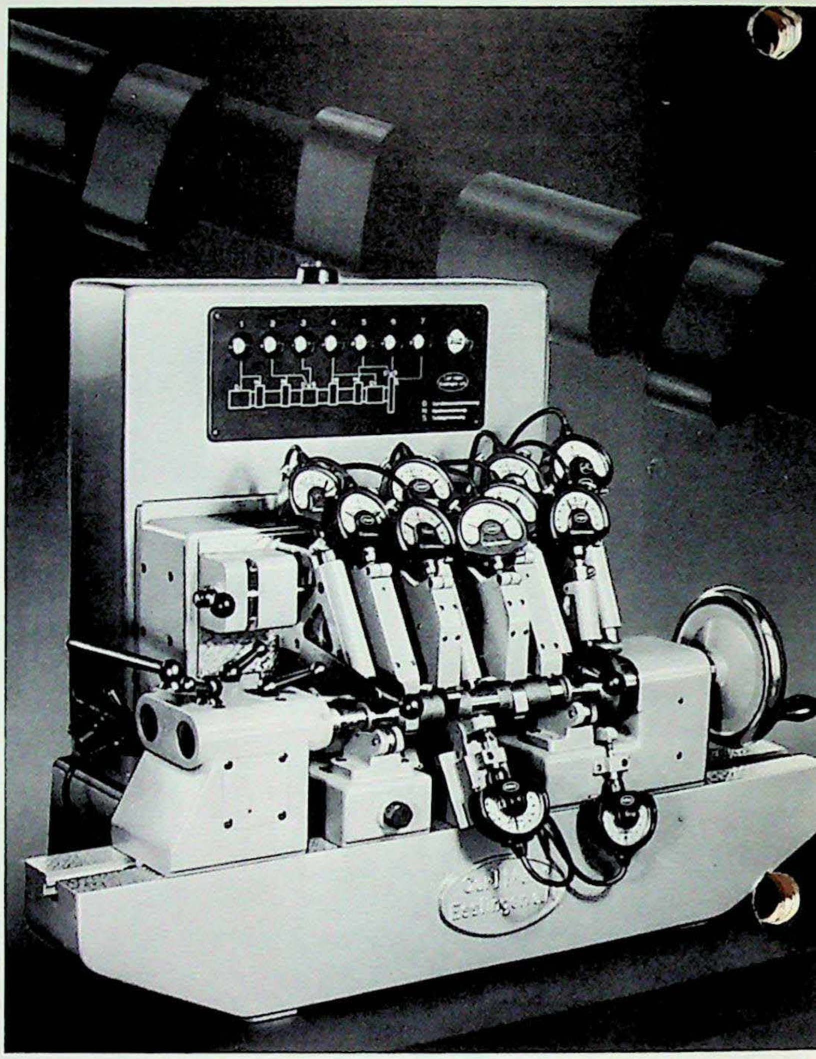
Length L	1", 2" 3"
Angle *a*	45° 60° 90°

Length L and angle *a* should be stated when ordering.

PRINCIPAL DIMENSIONS



Mahr ELECTRIC COMPARATORS

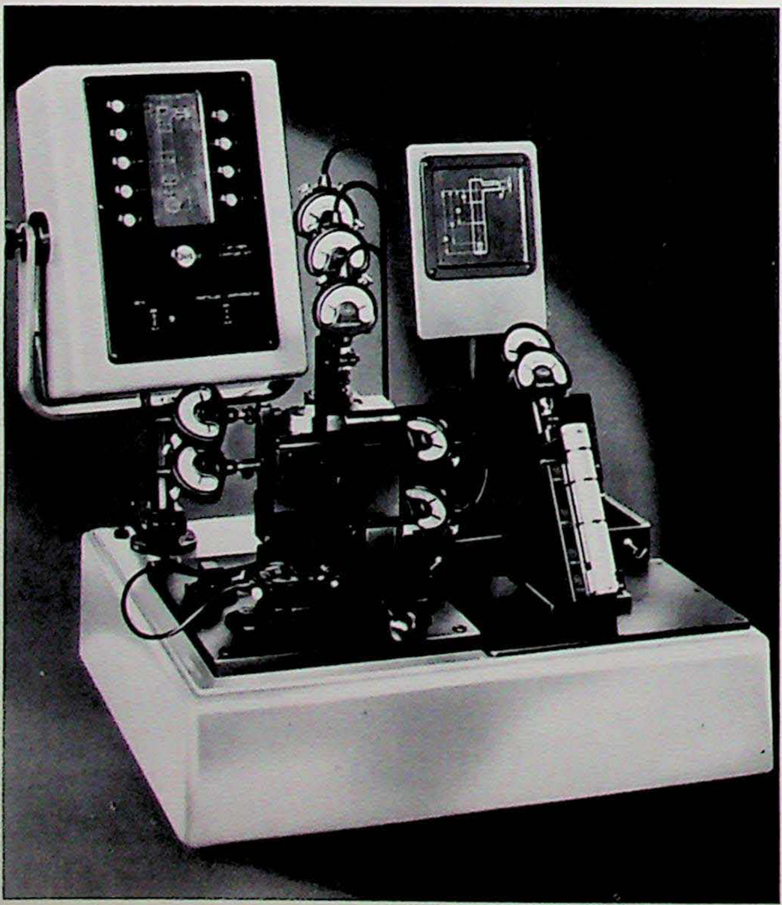


MAHR Precision Comparators with electric limit contacts indicating by signal light are the answer for RAPID inspection at CLOSEST tolerances.

For fast, effortless inspection of present-day tolerances and for the employment of automatic devices guided by the gaging result, ELECTRICITY is successfully used in transforming ordinary mechanical comparator gages into gaging units that indicate the passing of tolerances by flashing lights. Electric limit contacts built into the gaging unit will act with a finer discrimination than ordinary dial indicators, and off-size conditions can be detected within 10 millionths of an inch accurately and instantly.

In addition to superior accuracy, the electric comparator is FASTER than the usual mechanical indicating type gage since the eye perceives the signal lamps much more quickly. The human reaction to accepting or rejecting a workpiece is much more rapid under the stimulus of the flash of the light.

The signal light attachment provides a second socket for control connections, and makes further automation possible. Automatic controlling devices may be attached to this outlet. For instance, an acoustic signal may be sounded, whereby blind persons may be employed as inspectors. Or changes in dimensions beyond tolerance limits may be announced acoustically in comparators checking running work which is not observed continuously. Small parts may be segregated according to gaging results through switches controlled by the electric limit contacts, and the work guided into various sorting channels.



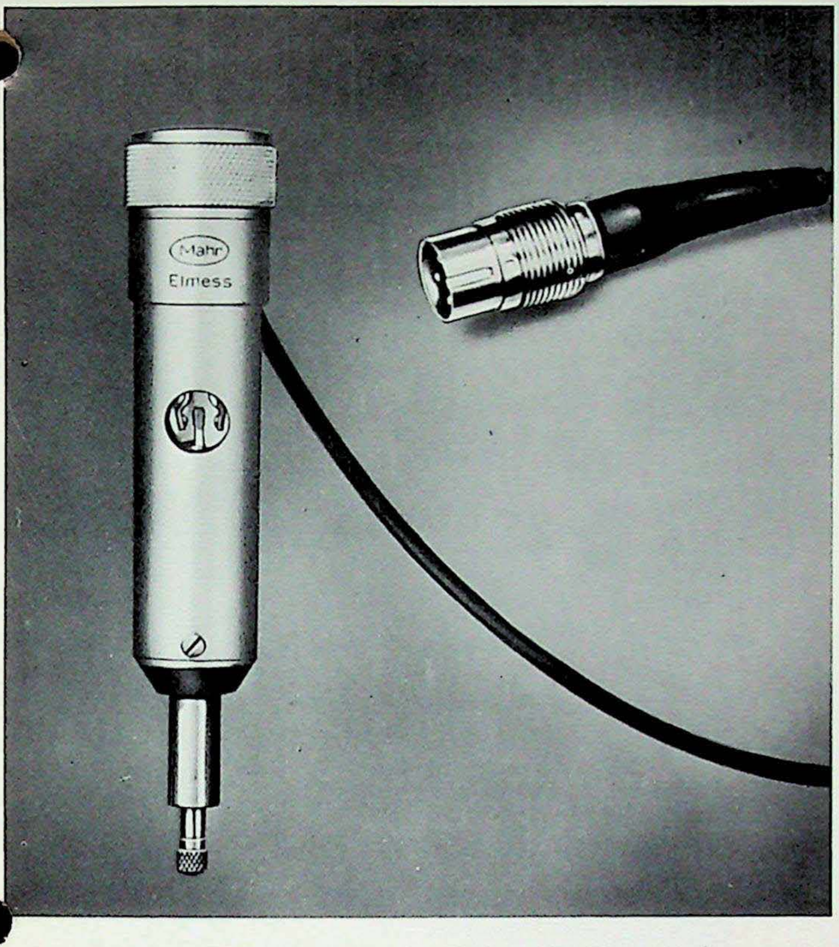
By installing auxiliary relays in the control circuit, it is possible to use heavier devices with a larger electric load, such as one that stops a machine whenever the work is gaged off-size by the comparator. A cylindrical grinder with an automatic device controlled by an "Elmillimess" electric comparator will stop the movement of the table, the turning of the workpiece and the flow of the coolant, and switches on the reverse movement of the grinding block as soon as the correct finished position is reached. Likewise an automatic control is effected in an internal grinder by measuring the position of the grinding spindle with the gaging unit, whereby the dimension of the bore is obtained indirectly.

Electric Comparators can be used in a variety of multiple installations, with a number of gaging stations connected to a signal light attachment, having a common O.K. light but separate plus and minus lights for each gaging station.

Electric Comparators may also be used as the basis for production statistics, with electric counters connected to the control outlet. In most cases two counters are attached: one for the total number of pieces checked, the other for the number of pieces accepted. The gaging unit thus serves as quality controlling device, without any extra installations beside the counters, saving the cost of an entire department.

An outstanding advantage of MAHR Electric Comparators Elmillimess and Elzentimess is that in addition to reading of Go and NoGo by lights, one can actually read at all times the ABSOLUTE dimensions FROM THE DIAL of the comparator.

Mahr ELECTRIC COMPARATORS



No. 1100 Electric Comparator "Elmess"

Of shockproof construction, with sturdy amplifying mechanism; overtravel. All parts which are subject to wear are TUNGSTEN CARBIDE faced. Precisely made precious metal contacts; chrome finished housing.

Method of operating: The contact lever to which the movement of the spindle is transmitted, closes preset contacts when the tolerance limits are exceeded.

Setting of tolerance limits: By two play-free set screws, protected by a detachable cap, set to plus and minus tolerances by gage blocks.

Specifications: No. 1100 "Elmess"

Maximum tolerance setting	.032″
Overtravel	.120″
Contact accuracy	±.000010″
Measuring pressure	5 oz.
Overall length	4⅝″
Largest diameter	⅞″
Shank diameter	.315″
Weight	4 oz.

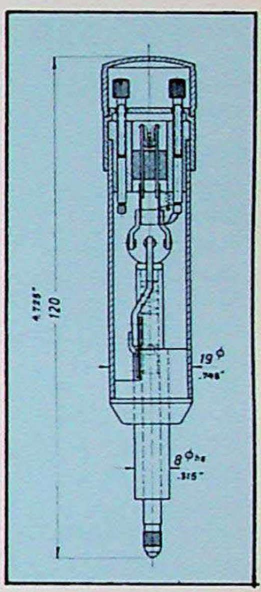
Furnished with standard ball contact tip and with bushing for ⅜″, in wooden case.

Extra Contact Tips, refer to page 15.

Refer to pages 27-30 for suitable stands.

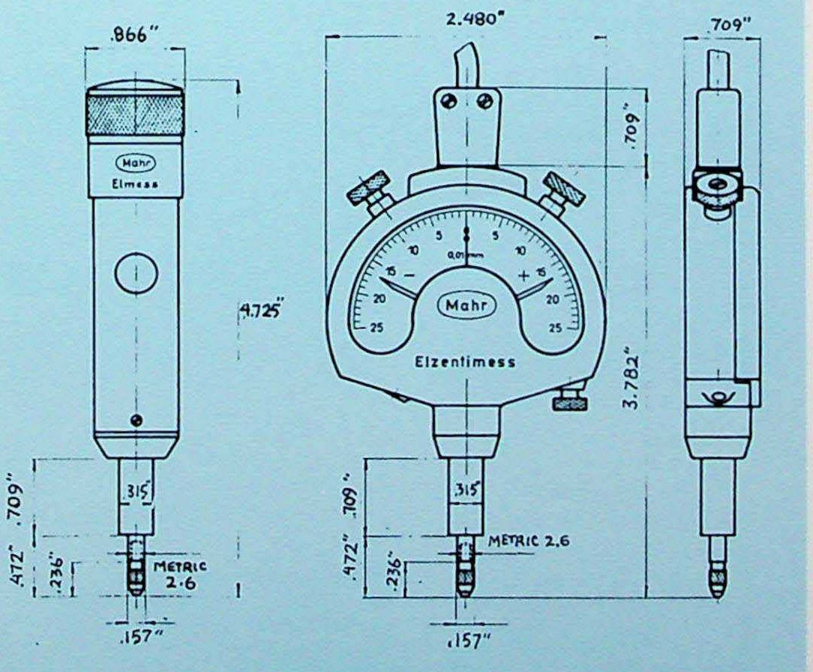
Observe these important features:

The total range of the "Elmess" Electric Comparator is .032″. The contact accuracy is ±.000010″.



Minimum space requirements for MAHR Electric Comparators. Their principal dimensions correspond to our small precision comparators shown on pages 14 and 15. They are readily interchangeable and may be used in multiple testing devices for simultaneous checking of several closely situated dimensions on one workpiece (see fig. 4 on page 18).

Principal Dimensions



"Elmess" No. 1100

"ELMILLIMESS" No. 1120Z/1124Z and "ELZENTIMESS" No. 1110Z/1114Z

Electrical Specifications for all Mahr Electric Gages:

Electric Comparators No. 1100-1124

Maximum operating voltage	6 Volt
Maximum amperage with non-inductive load	0.1 Amp.

The switching accuracy values specified on pages 17-19 apply at a non-inductive load up to 30 mA/6V. At a maximum load of 100 mA/6 V these values are to be doubled.

Signal Light Boxes No. 1141 and 1144

Voltage across contacts in the comparator	5.5 V
Current through contacts in the comparator	30 mA
Signal lamps	6V/1.5W

Switching capacity of control contacts:

These are dead relay contacts and must be supplied from a separate source of current. With arcing suppressed by a suitable condenser a life of more than 10 million operations will be obtained when operated within the permissible voltage, power and current limitations as follows:

Maximum voltage	100 V
Maximum power	30 W
Maximum current	1 A

Mahr ELECTRIC COMPARATORS

No. 1110 Z, 1115 Z and 1120 Z Electric Comparator

This construction provides reading of gaging result relative to tolerances on the light indicator and of the deviation from the nominal size on the scale of the comparator.

Method of operating: The measuring spindle travel is transmitted to a dial and to a contact lever which closes preset contacts when the tolerance limits are exceeded.

Setting of tolerance limits: After the comparator is set to nominal size by gage blocks, the contacts can be set to the upper and lower limits by individual fine adjustment screws on the top of the housing. This may be done directly from the scale without the use of additional gage blocks.

Construction: Shock protected mechanism. Pivots turn in jewelled bearings. Spindle and mounting shaft made of hardened stainless steel. Electric cord removable from comparator.

Specifications:	"Elzentimess"	"Elcompramess"	"Elmillimess"
Catalog No.	1110 Z	1115 Z	1120 Z
Graduations	.0005″	.0001″	.000050″
Total range	±.010″	±.005″	±.002″
Overtravel	.100″	.100″	.110″
Measuring pressure	5 oz.	6 oz.	7 oz.
Contact accuracy	.000050″	.000030″	.000010″
Shank diameter	.315″	.315″	.315″
Weight	4 oz.	4 oz.	4 oz.

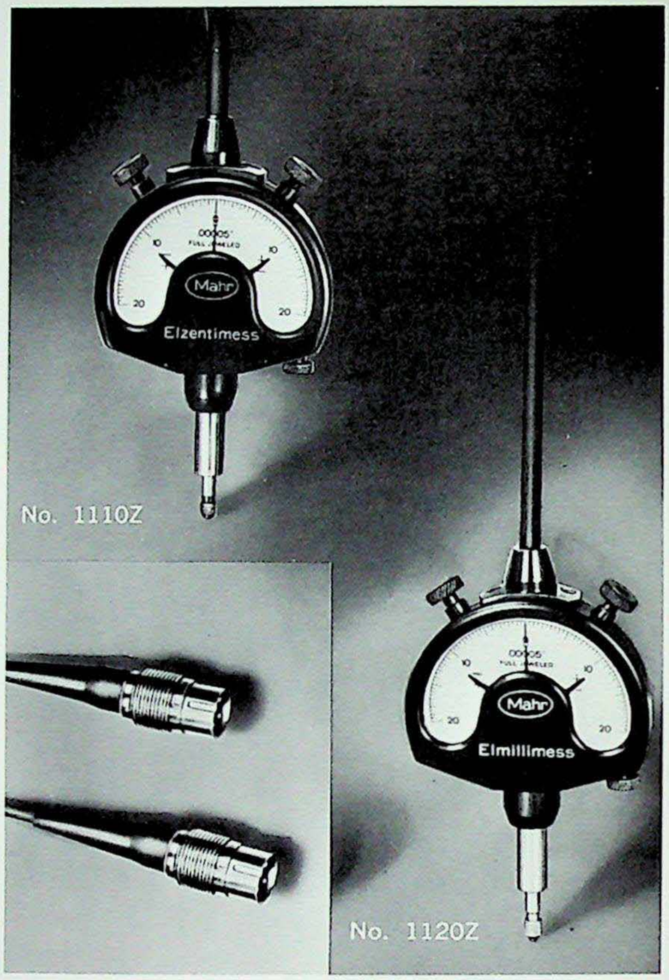
Furnished with standard ball contact tip and with ⅜″ bushing for AGD, with cable release and turn knob, in clear plastic case.

Extra Contact tips, refer to page 15.

Millimeter graduations in 1/100 mm and 1/1000 mm available. Refer to pages 27-30 for suitable stands.

Straight and angular holders for special mounting of comparators, refer to page 15.

Electrical specifications, refer to page 17.


No. 1110Z

No. 1120Z

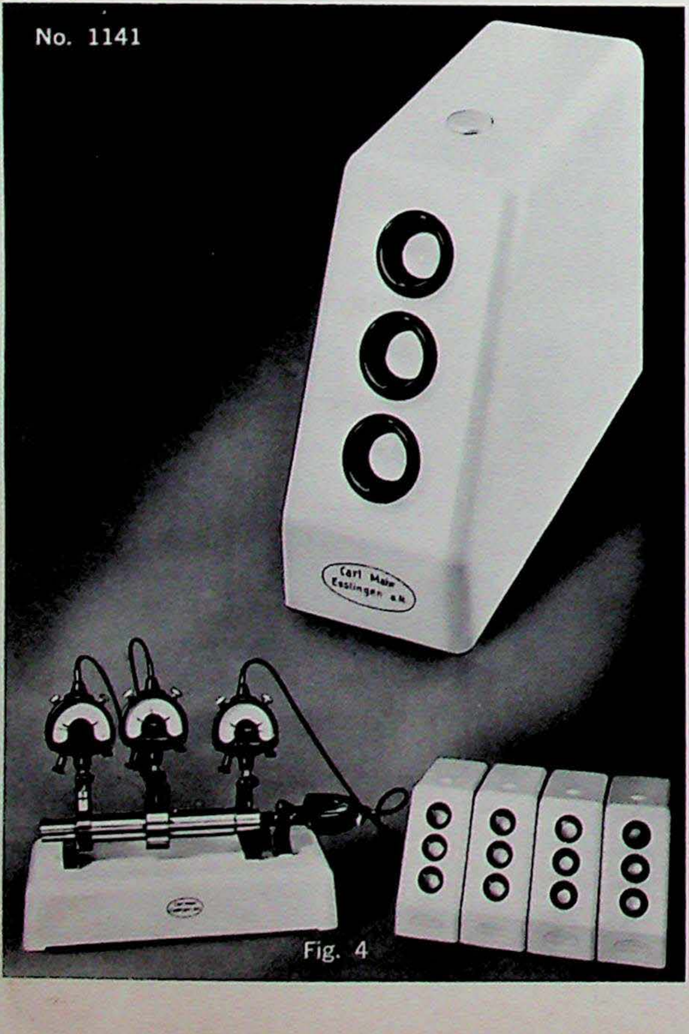

No. 1141

Fig. 4

No. 1141 Signal Light Box

Indicates undersize, good and oversize by flashing of red, green and white signal lights. A socket provides connections to Electrical Comparators described on pages 17-18.

A second socket is provided to make connections for control purposes. Apparatus has re-arrangeable internal connections for direct operation on 110, 125 or 220 Volts AC, 40-60 cycles.

A switch provides change of rotation of the signal lights for use with inside and outside measurements.

The high grade precision relays for operating the light signals guarantee highest switching accuracy even after many millions of gagings.

Switching accuracy is .000010″ when using Comparator "Elmess" or "Elmillimess," .000030″ when using Comparator "Elcompramess" and .000050″ when using Comparator "Elzentimess."

These signal light boxes are extraordinarily robust and vibrationproof. They are shock resistant and have a breakproof housing.

If desired, the instrument can be utilized to store measuring results whereby the individual measurements are preserved until the next work is placed under the gage.

Dimensions: 7″ x 2⅜″ x 5″. Electrical specifications on page 17.

Multiple Inspection

Since the signal lights are vertically arranged, Signal Light Boxes can be placed side by side for multiple inspection, as illustrated. This arrangement offers inexpensive multiple inspection for short-run gaging. In minutes, this equipment may be re-arranged for another job and the Electric Comparators and Signal Light Units may be used over and over again.

Signal Light Boxes for multi-measuring stations can be furnished in every required form. Specify requirements.

Mahr ELECTRIC COMPARATORS

Electric Comparators with 4 Contacts

No. 1114 Z "Elzentimess", graduated in .0005".
No. 1124 Z "Elmillimess", graduated in .000050".
For sorting work in 5 groups and for controlling machines.

Millimeter graduations in 1/100 and 1/1000 mm available.

These Electric Comparators have 4 adjustable contacts, thereby providing 5 switching zones. For sorting work pieces and for statistical quality control. Electric Comparators are used in connection with the highly sensitive Light Indicator No. 1144, which has 5 signal lights. Within the good range the work is classified into 3 groups by the green lights one, two and three; furthermore into groups for oversize and undersize by white and red signal lamps.

These Electric Comparators are also particularly suitable for controlling machines. Dependent on the dimensions of the work four different impulses may be transmitted, by means of which feeds may be controlled. Thus, when for example a selected dimension has been obtained, an impulse from the comparator might automatically switch from coarse to fine feed.

Electrical specifications and principal dimensions refer to page 17.

Mahr
Elmillimess

Specifications	"Elzentimess"	"Elmillimess"
Catalog No.	1114Z	1124Z
Graduations	.0005"	.000050"
Total Range	±.010"	±.002"
Overtravel	.100"	.110"
Contact Accuracy	±.000050"	±.000010"

Furnished with standard ball contact tip and with ⅜" bushings for AGD with cable release and turn knob in clear plastic case.

Metric graduations available.

No. 1144 Signal Light Box

With 5 signal lamps for sorting in three "good" groups (green lamps), one oversize and one undersize group (white and red lamps).

A second socket is provided to make connections for control purposes, such as sorting, machine control, etc.

Auxiliary relays may be operated by this circuit to handle currents as large as necessary for a given application.

This control connection is frequently used to operate acoustic signals.

If desired, the instrument can be utilized to store measuring results whereby the individual measurements are preserved until the next part is placed under the gage.

For operation on: 110 Volts AC (may be readily changed to 220V or 125V).

Dimensions: 7¼" x 8¼" x 3".

Electrical specifications refer to page 17.

No. 1144 Signal Light Box, with 5 Signal Lamps.

Switching accuracy when using
"Elzentimess" #1114Z .000050" or
"Elmillimess" #1124Z .000010" for
110 Volts AC (May be readily changed to 220 Volts or 125 Volts).

Mahr ELECTRONIC COMPARATORS

Electronic Precision Comparator "Millitron"

for rapid and reliable measuring of small and minute dimensional variations. The super-accurate amplifier has outstanding features such as Scale selector Color coded to scale, offering extreme versatility.

Fully transistorized amplification provides highest accuracy and measuring sensitivity. No warm-up required, instrument is ready for measuring upon turning of switch. Printed circuits on interchangeable plates make the unit exceedingly sturdy in operation and simplify maintenance.

Constant measuring accuracy and extraordinary stability of zero setting and scale transmission. An exclusive amplifier component guarantees constant accuracy under fluctuations of voltage and temperature.

The instrument has a sensitive electric zero adjustment with a safeguard against inadvertent disturbance. Changing from scale to scale, the zero setting remains constant; no adjustment necessary. The relatively high voltage (6V) permits connections of accessories like recording devices, directly to the unit. The rapidity of transmissions, amounting to only one millisecond, enables the instrument to registe SUPER ACCURATE.

Accuracy:

Maximum permissable error 1% of the measuring range of each scale. Repeatability within .0000004″ (four tenths of a millionth). Stability of zero and magnification over 300 hours better than .2%.

Special Features:

Amplifiers are suitable for connection of either a single gaging head for single measuring, or two gaging heads for measuring of the sum or difference between the two measurements. A built-in switch effects the change-over from single measuring to sum or difference measuring.

Instruments are equipped with 2 adjustable tolerance markers.

Housing:

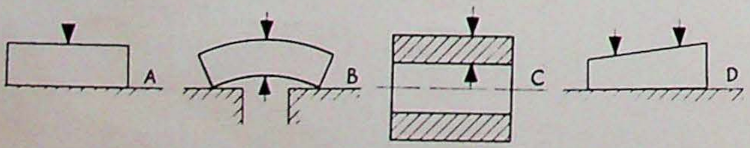
Handy, robust steel housing with convenient carrying handle.

Dimensions: 8″ x 6″ x 6″
Weight : 7 lbs.
Voltage : 125, 220AC ±15% 50—60 cycles.

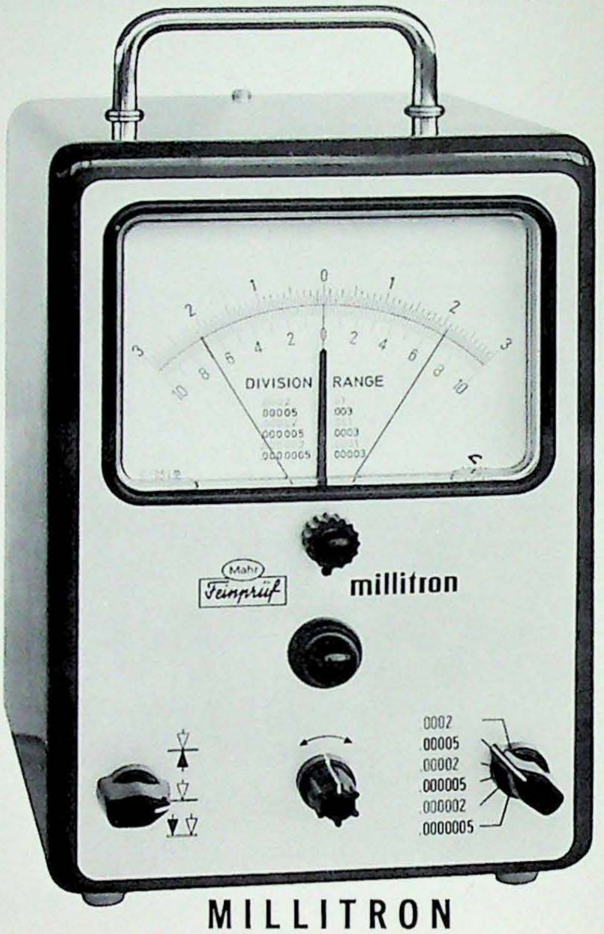
Special Amplifiers:

Additional special models are available for special purposes, such as run-out and out-of-round conditions, for sorting of work to tolerance grades, whereby the gaging relative to preset tolerances is indicated by signal lights and for group-classification in statistical quality control with digital read-out, and for control of automatic devices guided by gaging results and numerous other applications.

Typical Measuring Applications:



No. 1203 Z with 6 Measuring Ranges



MILLITRON

Specifications: MILLITRON

with 6 measuring ranges

No. 1202 Z

Graduation	.000002″	.000005″	.00002″	.00005″	.0002″
Range	±.0001″	±.0003″	±.001″	±.003″	±.01″
Graduation	.0005″				
Range	±.03″				

No. 1203 Z

Graduation	.0000005″	.000002″	.000005″	.00002″
Range	±.00003″	±.0001″	±.0003″	±.001″
Graduation	.00005″	.0002″		
Range	±.003″	±.01″		

No. 1204 Z

Graduation	.0000002″	.0000005″	.000002″	.000005″
Range	±.00001″	±.00003″	±.0001″	±.0003″
Graduation	.00002″	.00005″		
Range	±.001″	±.003″		

A simplified model for connection with a single gaging head only can be furnished which is accurate to within 2% of the measuring range of each scale. Specifications are as follows:

MILLITRON
with 5 measuring ranges

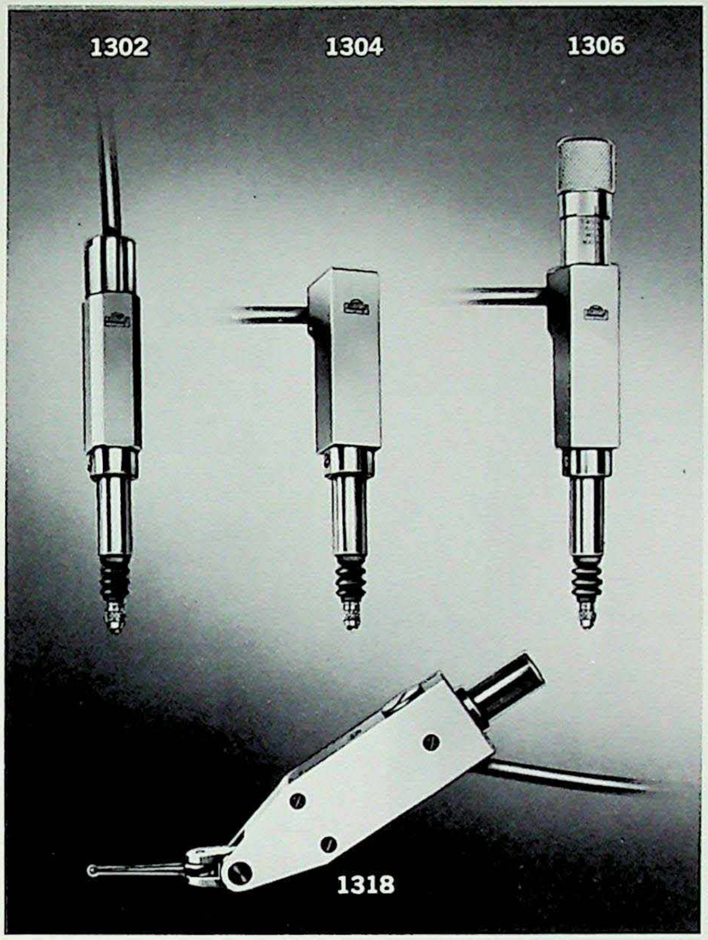
No. 1201 Z

Graduation	.000002″	.000005″	.00002″	.00005″
Range	±.0001″	±.0003″	±.001″	±.003″
Graduation	.0002″			
Range	±.01″			

Metric graduation available.

Select gaging heads from page 21.

Mahr ELECTRONIC COMPARATORS



Gaging Heads

for use with "Millitron"

All gaging heads described below have a stable dull chromed steel housing, are shockproof and have sufficient overtravel to make them safe from damage from mechanical strain. Feeler points are interchangeable and are ball-tipped for standard applications; other types of feeler points are optionally available (refer to page 15). A cable release for lifting the feeler point is furnished as standard equipment. Rubber boots protect spindle against dust.

Specifications:

Catalog No.	1302	1304
Measuring range	.040	.040
Cable exit	axial	lateral
Mounting shaft	.315"*	.315"*
Measuring pressure	1 oz.	1 oz.
Dimensions	3¾"x½"x½"	3⅜"x¾"x½"

Catalog No.	1306	1318
Measuring range	.040	.045"
Cable exit	lateral	axial
Mounting shaft	.315"*	.315"*
Measuring pressure	adjustable from .3 oz. to 4 oz.	1 oz.
Dimensions	4¾"x¾"x½"	2⁷⁄₁₆"x½"x¾" †

*⅜" bushing for AGD is furnished with each gaging head at no charge

†excluding ¾" long contact point

The above listed measuring pressure refers to horizontal position of feeler point. If different measuring pressure is required, ask for quotation.

For special purposes, we can furnish a gaging head with enlarged range of ±.200". An adapter for 10 x magnification of ranges permits the use of our standard Millitron amplifiers. Dimensions are 4¾" x ½" x ½", cable exit is axial. Use Catalog No. 1302/10.

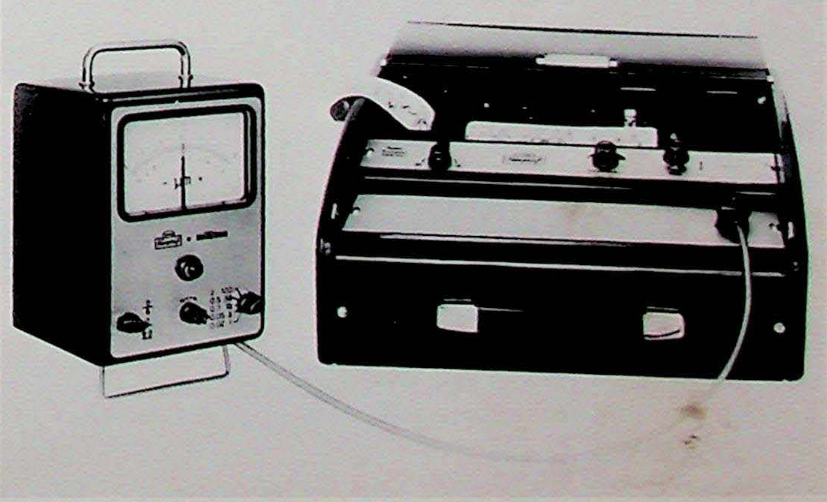
Electrical Recording Unit No. 1295

This recording unit can be connected to the Millitron instrument without intermediate amplifier. The measuring values are recorded continuously on thermosensitive diagram paper 1-3/14" wide. Graduation lines on the diagram paper equal the graduations on the Millitron amplifier. The paper is moved by a 4-speed synchronous motor.

Paper speed	.04, .08, .2 and .4"/s
Recording width	1-3/14"
Voltage power requirements	125, 220AC 10 ±15% 50—60 cycles
Overall dimensions	15" x 15" x 7"

The unit is supplied with a connector cable to the Millitron instrument.

No. 1295 Recorder



Mahr ELECTRONIC COMPARATORS

Electronic Gage Block Comparator No. 1425 E with Millitron

for rapid gaging of gage blocks or other high precision parts at extremely high accuracy. It uses the new concept of gaging by two gaging heads mounted opposite each other simultaneously. The sum of their measurements is read from the electronic amplifier. This eliminates measuring errors due to irregularities of shape or contact with the table surface.

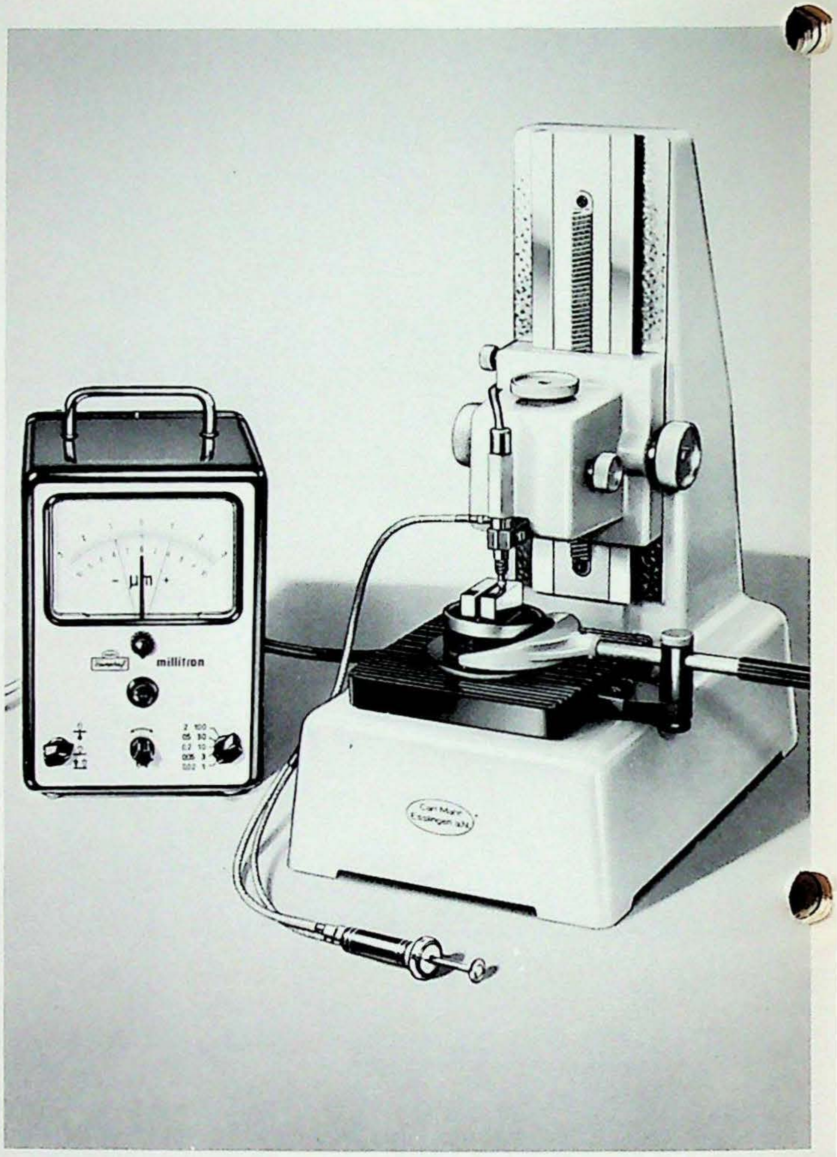
This Gage Block Comparator consists of the following:

No. 1425 E Comparator Stand

designed for mounting two gaging heads, one mounted in the carrier arm, the other inside the table. To achieve the ultimate in stability, base and column are made in one piece. The carrier arm is equipped with a fine adjustment which provides a fast and sensitive zero setting, essential for work with electronic gages. With the electronic gaging head mounted in its mounting bore, the carrier arm is moved along the column for coarse adjustment until it enters the range of its fine adjustment. In this position it is clamped tight. Thereafter the gage is set to a master by means of the fine adjustment located in the carrier arm. It is operated by turning a knurled screw on top of the arm and locked by another knurled screw at the side. The table has tungsten carbide inserts.

Vertical range	0—7″
Throat depth of carrier arm	4″
Size of serrated table	5⅛″ x 5⅛″
Diameter of mounting bore for gaging head	.375″*
Range of fine adjustment	.016″

*may be reduced to .315″ by a split bushing.



Electronic Gage Block Comparator No. 1425 E with Millitron

No. 1425 Em Manipulator

for moving gage block and master between the feeler points of the gaging heads free from influence of human temperature.

No. 1425 Ea Mounting Plate

for gage blocks in two sizes:

Size I for blocks up to .400″

Size II for blocks over .400″

No. 1425 Ek Mounting Cages

for larger gage blocks, in two sizes:

Size I for blocks from 1″ to 2⅜″

Size II for blocks over 2⅜″

The Mounting Cages No. 1425 Ek are used in combination with Mounting Plate size II. The Mounting Plates have recesses for inserting the testpiece and master immediately next to each other.

No. 1425 Eg Glass Screen

for protection from body temperature of operator.

No. 1425 Ed Double Cable Release

for simultaneous lifting of both gaging heads.

To complete the gaging system, two gaging heads No. 1302 and the electronic amplifier No. 1203 Z (or 1204) are employed (refer to page 20).

Mahr ELECTRONIC COMPARATORS

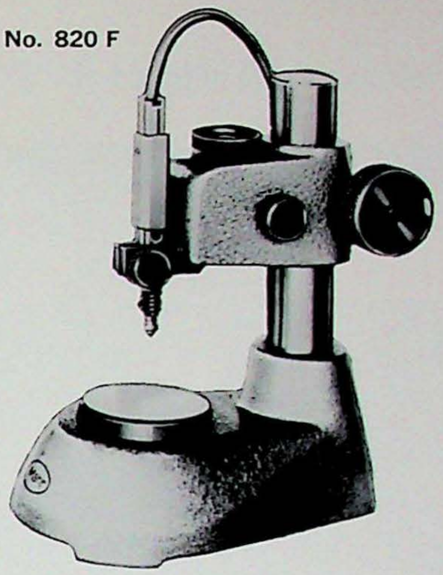
Small Comparator Stand No. 820 F with Fine Adjustment

Basically the same as our small comparator stand No. 820 for mechanical dial comparators (page 28). It is equipped with a fine adjustment which provides a fast and sensitive zero setting, essential for work with electronic gages. With the electronic gaging head mounted in its mounting bore, the carrier arm is moved along the column for coarse adjustment until it enters the range of the fine adjustment. In this position it is clamped tight. Thereafter the gage is set to a master by means of the fine adjustment located in the carrier arm; it is operated by turning a knurled screw on top of the arm and locked by another knurled screw at the side.

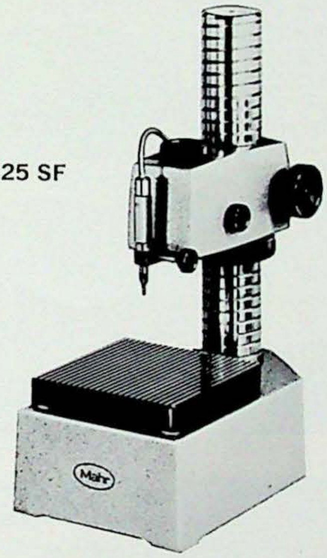
Specifications:

Vertical range	0—2⅜"
Throat depth of carrier arm	2"
Diameter of column	1"
Diameter of table	2"
Range of fine adjustment	.016"
Mounting bore for gaging head	.375" diameter*

*may be reduced to .315" by a split bushing. This stand is also available with sinter ceramic table. Use Catalog No. 820 Fsk.



No. 820 F



No. 825 SF

Heavy Comparator Stand No. 825 SF with Fine Adjustment

for precision gaging of work in larger dimensions. It can be adapted for many special gaging situations by a variety of accessory tables and V-blocks. The serrated table is hardened, ground and lapped to finest precision accuracy. The carrier arm is equipped with a fine adjustment, designed and operated as in comparator stand No. 820 F, above.

Specifications:

Vertical range	0—7"
Throat depth of carrier arm	4"
Diameter of column	2"
Size of serrated table	5⅛" x 5⅛"
Mounting bore for gaging head	.375"*
Range of fine adjustment	.016"

*may be reduced to .315" by a split-bushing.

Accessories:

Same as for Stand No. 825 S. Refer to page 28.

Heavy Comparator Stand No. 1028 KF with Fine Adjustment

for single and sum measurements.

This stand is particularly suited for either single measurements or sum measurements, because it is equipped with special tables having provisions for mounting a second gaging head from underneath. The T-shaped base gives this stand a large measure of stability.

For sum measurements, the two electronic gaging heads are mounted in bores of .315" I.D. After adjustment of the lower gaging head mounted in the table, the carrier arm with the upper gaging head is moved by a knurled nut at its bottom side until it reaches the range of the fine adjustment. In this position the carrier arm is locked tight. Then the carrier arm is set to a master by its fine adjustment screw on its top, and the setting locked by the locking screw on its side.

The tables are interchangeable and fastened to the base by Allen screws at their sides. Four tables are available:

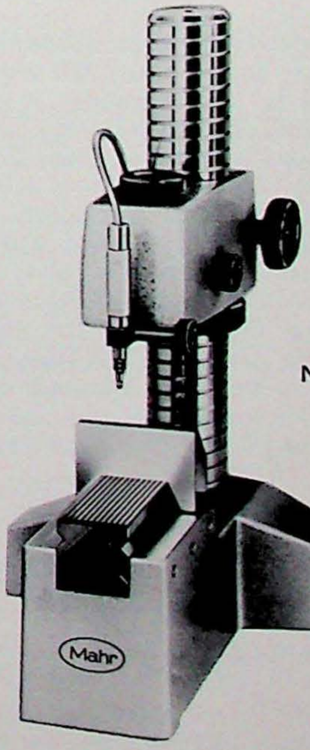
No. 1028 KFa for sum measuring, table size 4 x $1\frac{9}{16}$"
No. 1028 KFb for sum measuring, table size 4 x 4"
No. 1028 KFc for single measuring, table size 4 x $1\frac{9}{16}$"
No. 1028 KFd for single measuring, table size 4 x 4"

Specifications:

Vertical capacity	0—7"
Throat depth of carrier arm	4"
Diameter of column	2"
Diameter of mounting bore for gaging head	.375"*
Range of fine adjustment	.016"

*may be reduced to .315" by a split bushing.

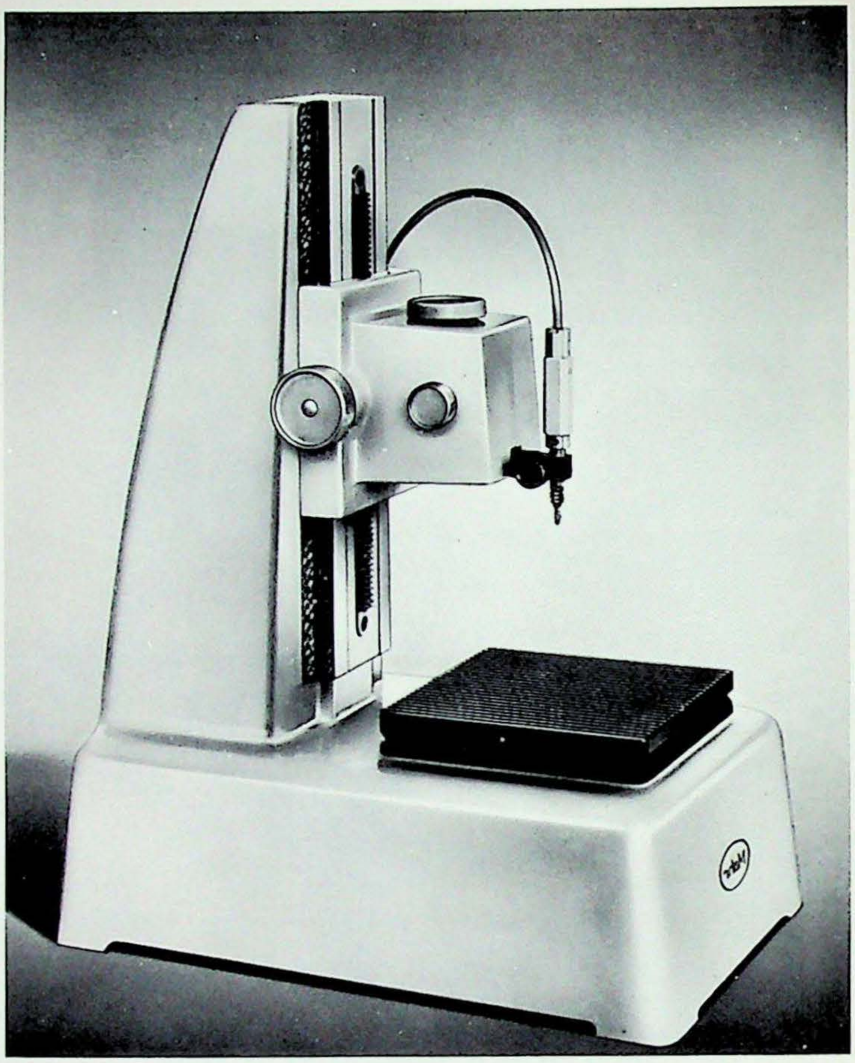
The table No. 1028 KFc can be furnished with an adjustable backstop for work positioning.



No. 1028 KF

No. 1425 KF

UNIVERSAL FINE PRECISION COMPARATOR STAND



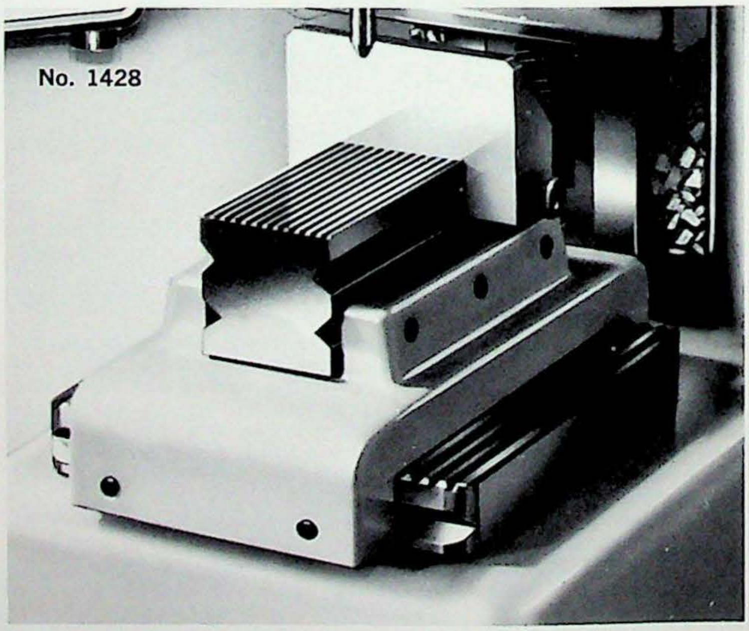
Universal Fine Precision Comparator Stand No. 1425 KF

This stand is essentially of the same construction as the Gage Block Comparator Stand No. 1425 E (page 22), with base and column made in one piece for utmost stability. It is the ideal stand for use in connection with the electronic comparators "Millitron." The serrated table is hardened, ground and lapped to finest precision accuracy. The carrier arm is equipped with a fine adjustment which provides a fast and sensitive zero setting, essential for work with electronic gages. With the electronic gaging head mounted in its mounting bore, the carrier arm is moved along the column for coarse adjustment until it enters the range of its fine adjustment. In this position it is clamped tight. Thereafter the gage is set to a master by means of fine adjustment located in the carrier arm. It is operated by turning a knurled screw on top of the arm and locked by another knurled screw at the side.

Specifications:

Vertical range	0—7″
Size of serrated table	5⅛″ x 5⅛″
Diameter of mounting bore for gaging head	.375″*
Range of fine adjustment	.016″

*may be reduced to .315″ by a split bushing.



Auxiliary Table No. 1428

This table is mounted over the standard table of stand No. 1425 KF. Its dimensions are 4″ x 1 9/16″, the top surface is serrated, the underside precision lapped, reversible to suit various purposes. The table surface is equipped with an adjustable backstop for correct positioning of cylindrical work.

Mahr ELECTRONIC COMPARATORS

NEW pocketsize Precision Comparator, overall dimensions 4¼"x3"x1½". As portable as a transistor pocket radio.

Here is a "first" of an electronic length measuring comparator.

Why is this Electronic Amplifier different from all others? The unique design is the answer. Its extremely small dimensions make the "Millitron-m" a most practical unit where working space is limited. Just approximately 4¼" x 3" x 1½" in size, at a total weight of less than 8 oz. (plus 3 oz. for a battery), this unit is completely portable. One can hold it in the hand.

"Millitron-m" combines the flexibility of mechanical comparators with the outstanding advantages of all MAHR electronic length measuring units, namely:

- High magnification
- Several measuring ranges in one instrument
- Low measuring pressure
- No reversing play

Three selectable ranges permit readings in 5 millionths, 50 millionths, and ½ thousandth of an inch. While it has a much higher magnification than mechanical instruments, vibrations and shocks will not influence its accuracy.

A convenient support on the back of the instrument permits placing the amplifier into easy to read position.

"Millitron-m" is operated by a mercury battery (Mallory TR-233-R) which has a life of more than 1000 hours.

A complete range of gaging heads guarantees the universal use of the "Millitron-m" and will aid in solving innumerable measuring problems. Select gaging heads from specifications on bottom of this page.

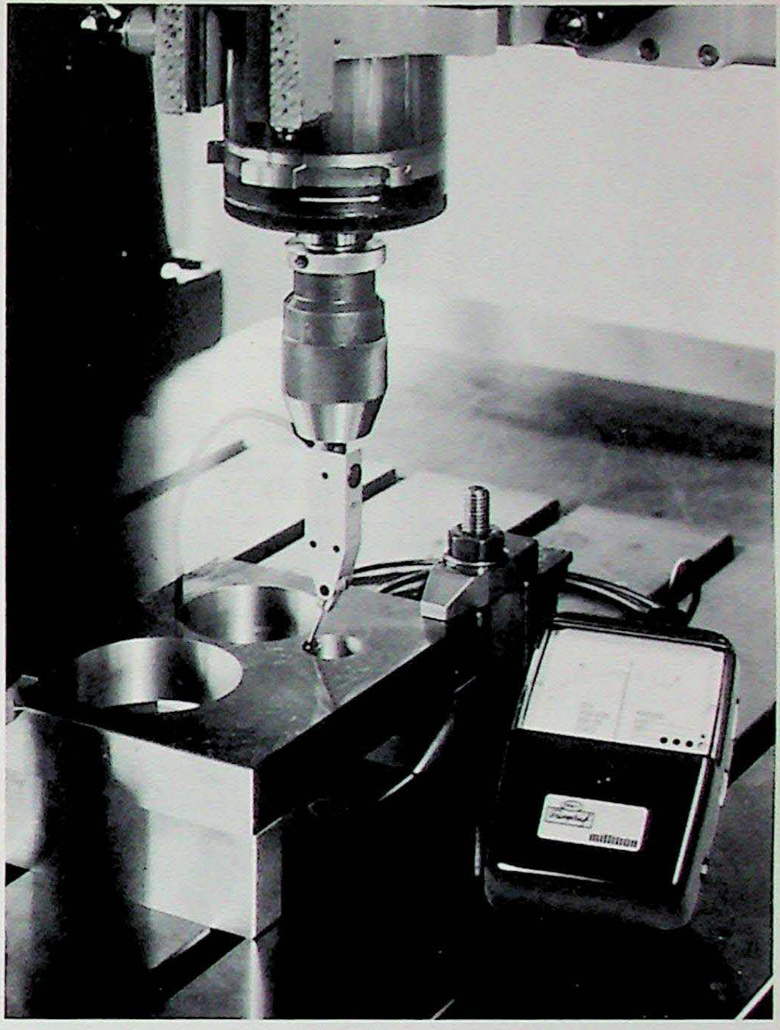
Specifications:

Millitron-m Amplifier
with 3 selectable measuring ranges

No. 1200 Z	**Graduation**	.000005"	.00005"	.0005"
	Magnification	11500	1150	115
	Range	±.0001"	±.001"	±.010"

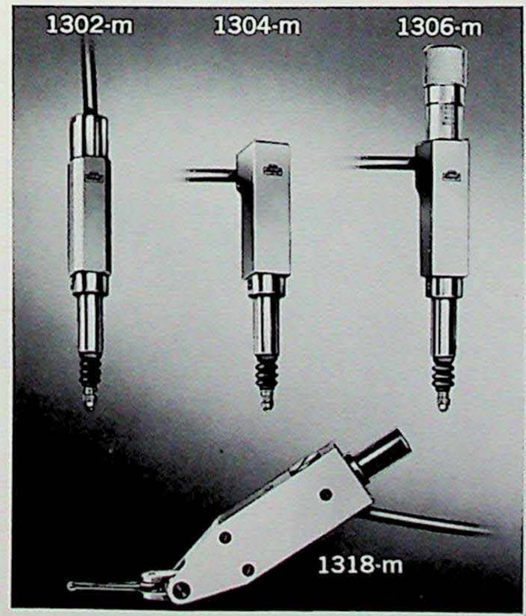
Optionally available:

Leather storage case or
Black finished wooden case with
space for 2 gaging heads and amplifier



Overall dimensions of Millitron-m:

Dimensions	4¼" x 3" x 1½"
Weight (including battery)	11 oz.
Length of scale	2⅜"
Battery	Mercury battery (Mallory TR-233-R)



Gaging Heads for use with Millitron-m

All Gaging Heads described here have a stable dull chromed steel housing, are shockproof and have sufficient overtravel to make them safe from damage from mechanical strain. Feeler points are interchangeable and are ball-tipped for standard applications. Other types of feeler points are optionally available. Refer to page 15. A cable release for lifting the feeler point is furnished as standard equipment. Rubber boot protects spindle against dust.

Specifications:

Catalog No.	1302-m	1304-m	1306-m	1318-m
Measuring range	.040"	.040"	.040"	.045"
Cable exit	axial	lateral	lateral	axial
Mounting shaft	.315"*	.315"*	.315"*	.315"*
Measuring prèssure	1 oz.	1 oz.	adjustable from .3 oz. to 4 oz.	1 oz.
Dimensions	3¾"x½"x½"	3⅜"x¾"x½"	4¾"x¾"x½"	2 7/16"x½"¾" †

*⅜" bushing for AGD is furnished with each gaging head at no charge.

†excluding ¾" long contact point.

Mahr LARGE PRECISION COMPARATOR

No. 1000 Z Precision Comparator "Millimess"

Large Type

Reading directly in .000050" or .000025", for comparative measurements of HIGHEST ACCURACY in inspection and shop. To be used on stands as illustrated on page 27 and 28 or to be built into existing fixtures or incorporated into special measuring devices and machine tools.

Specific Characteristics and Advantages

All polished pivots turn in jewelled bearings. The measuring motion is transmitted by a precision steel ball rolling along a finely lapped sapphire surface. Rapid measurements due to damping of the dial hand. The dial hand does not swing but moves instantly to the proper reading. The measuring spindle has on overtravel of .200" beyond the scale range and can be raised far enough when required by special measuring situations.

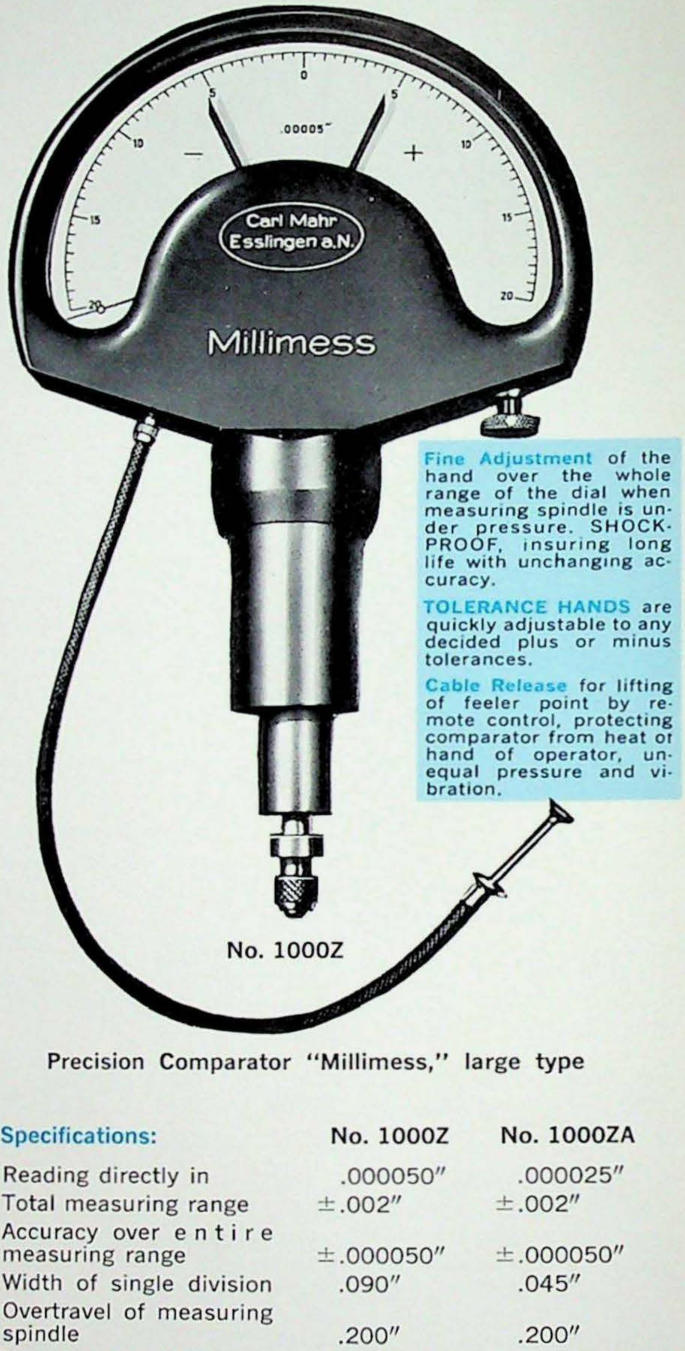
Measuring spindle with plane, most accurately lapped measuring face. The spherical contact point is mounted in a screw clamped split bushing which slips over the measuring spindle.

Dust protection: A rubber sleeve guards the measuring spindle guide at the shank against dust and dirt penetration.

Constant Measuring Pressure.

No Knife Edge Bearings.

Extremely rugged for shop use.

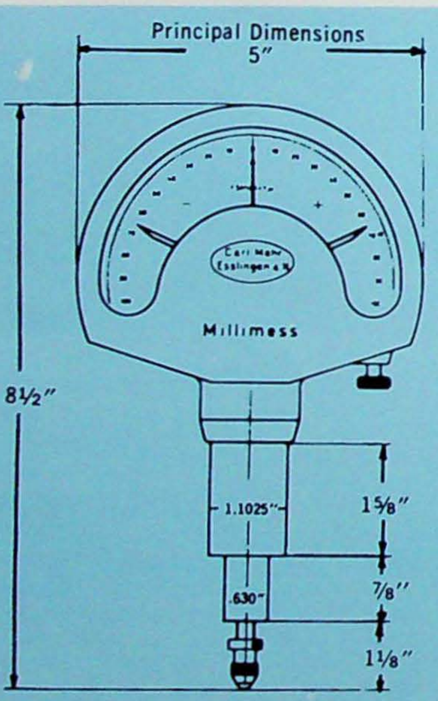


Fine Adjustment of the hand over the whole range of the dial when measuring spindle is under pressure. SHOCK-PROOF, insuring long life with unchanging accuracy.

TOLERANCE HANDS are quickly adjustable to any decided plus or minus tolerances.

Cable Release for lifting of feeler point by remote control, protecting comparator from heat of hand of operator, unequal pressure and vibration.

Precision Comparator "Millimess," large type



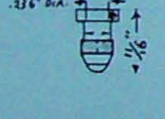
Specifications:	No. 1000Z	No. 1000ZA
Reading directly in	.000050"	.000025"
Total measuring range	±.002"	±.002"
Accuracy over entire measuring range	±.000050"	±.000050"
Width of single division	.090"	.045"
Overtravel of measuring spindle	.200"	.200"
Measuring pressure	10 oz.	10 oz.
Weight	1½ lbs.	1½ lbs.

Including wooden case, with standard steel ball contact tip and with cable release.

METRIC graduations, reading in 1/1000 mm are available.

Interchangeable CONTACT POINTS available

Standard



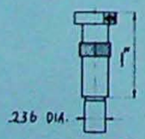
MA 1

Standard Steel Ball

Tungsten Carbide Ball

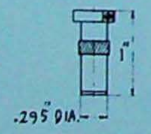
Ruby Ball

Extension



MA 2

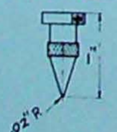
Plane



MA 3

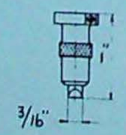
Tungsten Carbide tipped

Pointed



MA 4

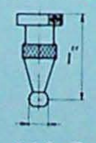
Blade



MA 5

Tungsten Carbide tipped

Ball Tip



MA 6

Standard Ball diameter .196"

Ball tip contact points can also be furnished to order with following ball diameters:
.078" .118" .255" .315" .433" .551" .699" .787" .937" 1.187"

Mahr COMPARATOR STAND

No. 1028 Heavy Comparator Stand

for Comparator "Millimess", large type, **No. 1000 Z** and **No. 1000 ZA.**

Observe T-shaped base providing unusual stability and requiring little space on the work bench. The measuring table is easily accessible. Furnished with adjustable back stop. Measuring table is reversible. One side serrated lengthwise, other smooth precision ground and lapped. A 4" x 4" serrated table (Cat. No. 1028a) can be furnished and is readily interchangeable. The moveable bracket holding the comparator may be raised and lowered on the precision ground and hardened vertical column by knurled ring nut. A fine adjustment is provided by a moveable bushing, adjustable in the bracket by a knurled ring nut. The final precise adjustment may be made with the fine adjustment screw on the outside of the housing of the comparator.

Other accessory tables can be furnished as specified on bottom of this page. This stand can also be supplied with a smaller bracket for mounting of small Comparators which are shown on page 14 and 15, as well as Electric Comparators, pages 17-19. For ordering this stand use catalog No. 1028 K.

Specifications:

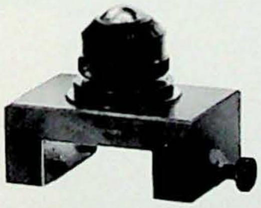
Table surface	4" x 1$\frac{9}{16}$"
Vertical capacity	6¼"
Throat (column to gaging point)	4"
Overall height	18"
Diameter of mounting bore	1.1025"
Weight	45 lbs.

Mahr Heavy Comparator Stands

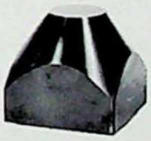
are a new concept in design. They provide rigidity for repeat readings with high amplification comparators.

Accessory Tables

optionally available as follows:

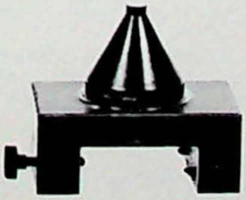


1028b

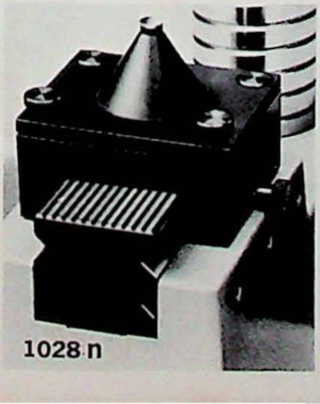


1028d

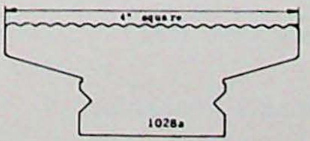
1028e

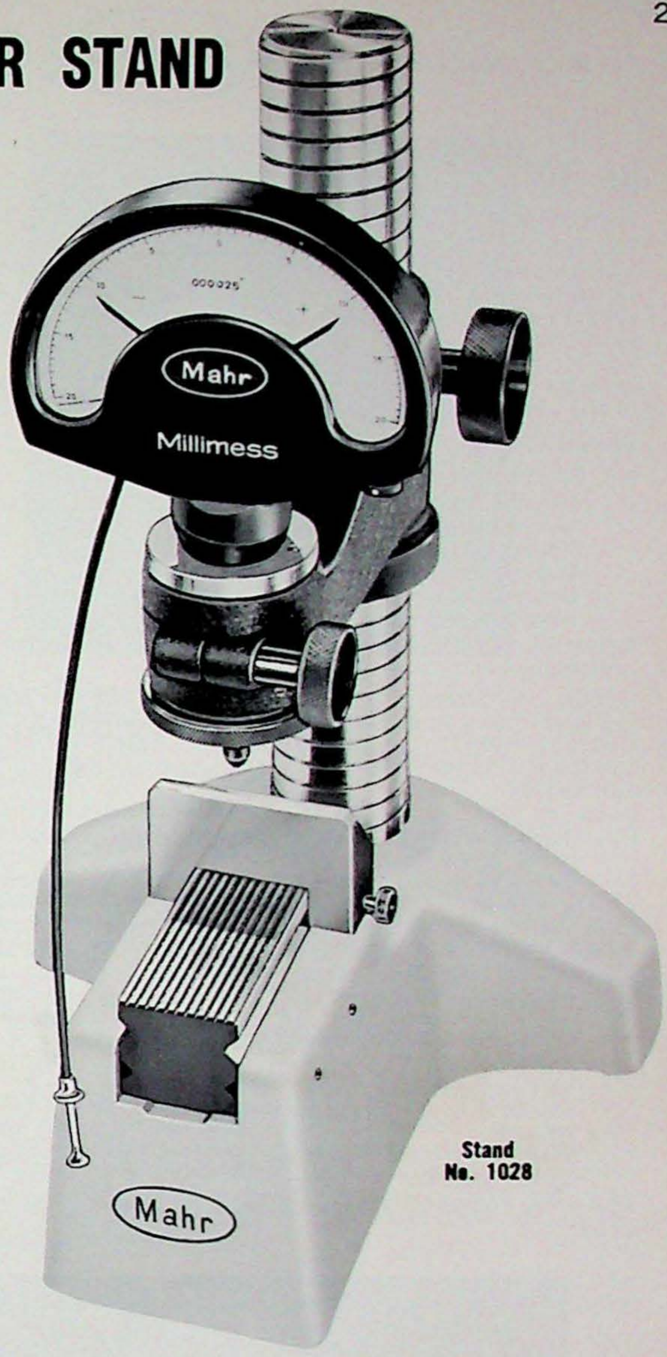


1028c



1028 n





Stand No. 1028

Specifications for Available Accessory Tables for No. 1028 Stand:

No. 1028 a	Serrated table 4" x 4" ✓
No. 1028 b	Large ball anvil table ⅜" radius
No. 1028 c	Pin anvil table 5/16" diameter flat
No. 1028 d	Wring-on table ¾" diameter flat
No. 1028 e	Wring-on table ⅜" diameter flat
No. 1028 n	Adjustable table with plane surface of 5/16" diameter

All measuring tables are HARDENED and PRECISION LAPPED.

Refer to page 28 for additional types of large Comparator Stands.

Mahr COMPARATOR STANDS

No. 1025 Heavy Comparator Stand

For Comparator "Millimess," large type, **No. 1000 Z, 1000 ZA.** The table surface is serrated lengthwise, hardened and precision lapped. The moveable bracket holding the comparator may be raised and lowered on the precision ground and hardened vertical column by knurled ring nut. A fine adjustment is provided by a moveable bushing, adjustable in the bracket by a knurled ring nut. The final precise adjustment may be made with the fine adjustment screw on the outside of the housing of the comparator.

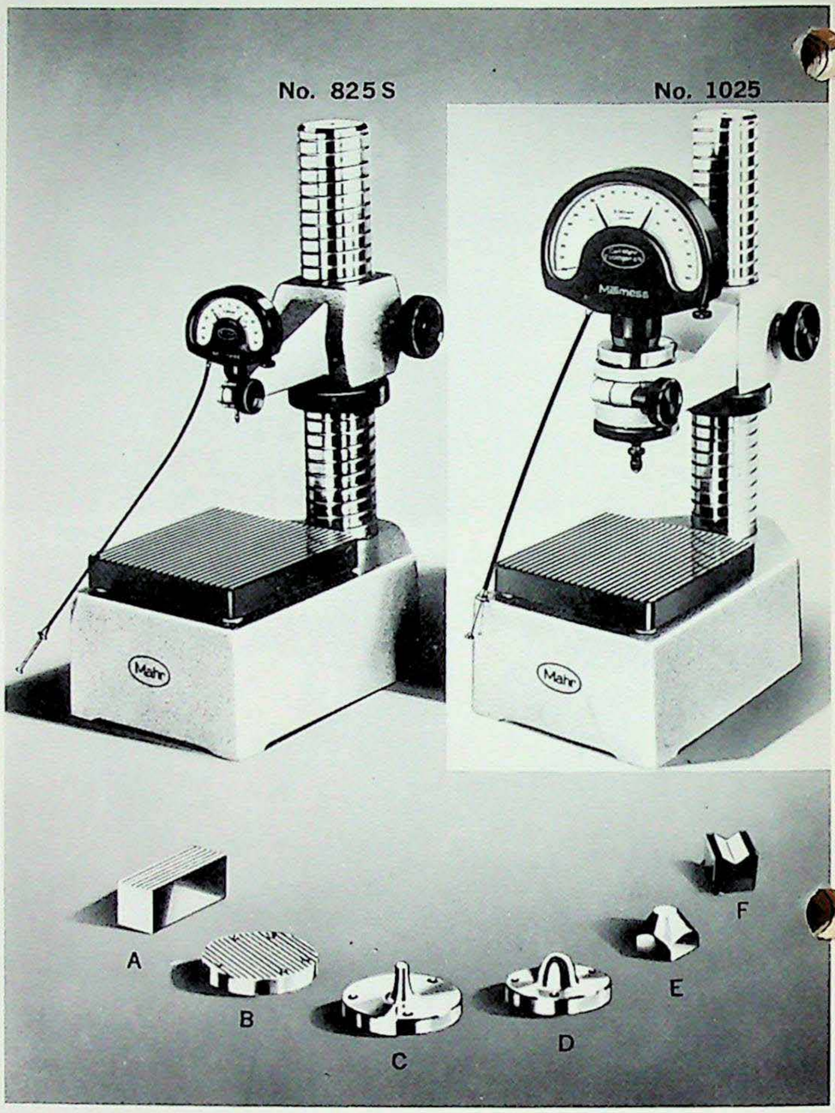
Specifications:

No. 1025 Heavy Comparator Stand

Table surface	5⅛"x5⅛"
Vertical capacity	7"
Throat (column to gaging point)	4"
Overall height	15"
Diameter of mounting bore	1.1025"
Weight	45 lbs

Accessory tables, all of them are hardened, ground and lapped, optionally available as illustrated:

1025a	1025b	1025c	1025d	1025e	No. 1025f
serrated 4"x1 9/16" only used with 1025b	serrated 3 9/16" diameter	pin anvil table ⅜" dia.	spherical table ¾" radius	wring-on table ¾" dia.	V block #107 V V angle 108°



No. 825 S Heavy Comparator Stand

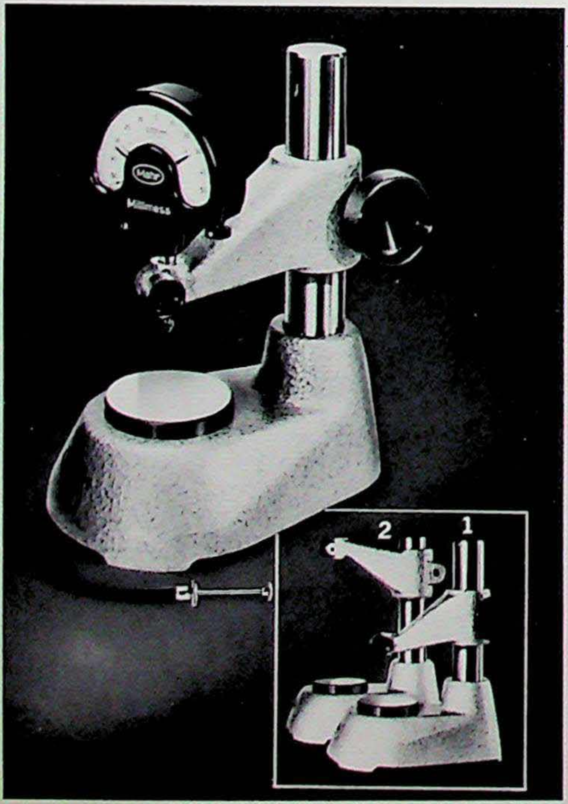
For mounting of small comparators, as shown on page 14 and 15 of catalog as well as electric Comparators, pages 17-19 This unit is identical with No. 1025 Stand, except it is supplied with a smaller bracket to accommodate small comparators, as illustrated.

Specifications:

No. 825 S Heavy Comparator Stand

Table surface	5⅛"x5⅛"
Vertical capacity	8"
Throat (Column to gaging point)	4"
Weight	43 lbs.
Diameter of mounting bore	.315"
Overall height	15"

Accessory Tables optionally available as illustrated and specified above.



No. 820 Small Comparator Stand

For small Precision Comparators, Dial Indicators and Electric Comparators.

This measuring stand is of extraordinary quality. The table is hardened and precision lapped. It will serve for the inspection of small work pieces, flat as well as cylindrical.

For coarse adjustment move bracket on the hardened and ground vertical column. Fine adjustment is made by turning the fine adjustment screw at the right of the comparator or by turning the dial of a dial indicator.

The bracket may be inverted to increase the measuring range. The measuring range when used as in illustration 1) 0"—2⅜" when used as in illustration 2) 2"—4½".

Specifications:

No. 820 Comparator Stand

Measuring range	0"—4½"
Diameter of table	2"
Throat (column to gaging point)	2"
Overall height	7"
Weight	5¾ lbs.

Optionally available:

This stand can be furnished with SINTERCERAMIC table. The hardness of this material is superior to tungsten carbide and guarantees longest wear. Specify: No. 820 SK

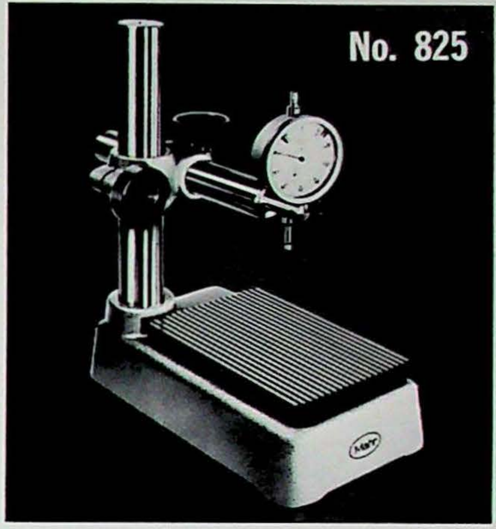
Mahr COMPARATOR STANDS

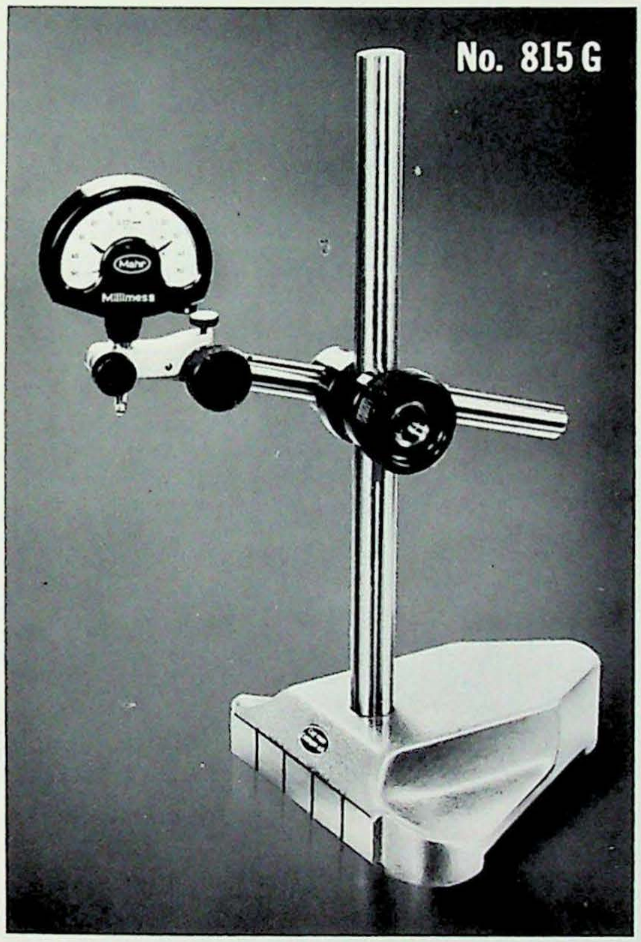
No. 825 Large Comparator Stand

A truly high precision stand. Special care has been taken in finishing the table surface, which is serrated, hardened, ground and precision lapped. Rapid adjustment of the dial indicator is accomplished by moving it along the hardened and ground horizontal and vertical columns. Fine adjustment by turning the dial, or with Precision Comparators by the fine adjustment screw on the right of the housing.

Specifications:

Vertical Capacity	6¼″	12″
Table Surface	6″ x 4″	6″ x 4″
Mounting Bore	.315″	.315″





No. 815 G Measuring Stand

With fine adjustment.

This new stand is particularly well suited for use on plane surfaces, such as cast iron or granite surface plates. Its heavy triangular base assures high stability and prevents tilting. The sturdy columns of .710″ diameter give utmost rigidity. Three flat surfaces on the underside of the base provide perfect contact position; the stand can be moved on the surface plate easily and free of vibration. The top of the base has a recess on either side for comfortable gripping. At the base of the triangle there is a ground flat surface to permit movement of the stand alongside edges or flat surfaces. This makes the stand ideal for checking for parallelism.

A novel conical clamping device for the columns adjusts the stand quickly and simply to any height and provides secure setting in any position with moderate tightening. The indicator carrier at the front end of the horizontal arm can be swivelled within 90°; as a result, dial indicators, comparators or dial test indicators "Puppitast" may be used in horizontal position. A fine adjustment screw permits convenient setting to the desired dimension.

The mounting bore of the indicator holder is for ⅜″ I.D. and will accommodate all Dial Indicators made to AGD specifications.

Specifications:

No. 815 G	Height of column (including base)	12″
	Throat depth	8″
	Diameter of column	.710″
	Base dimensions	6″ x 6″
	Mounting bore	⅜″ (AGD)

No. 815 S Extra Heavy Duty Stand

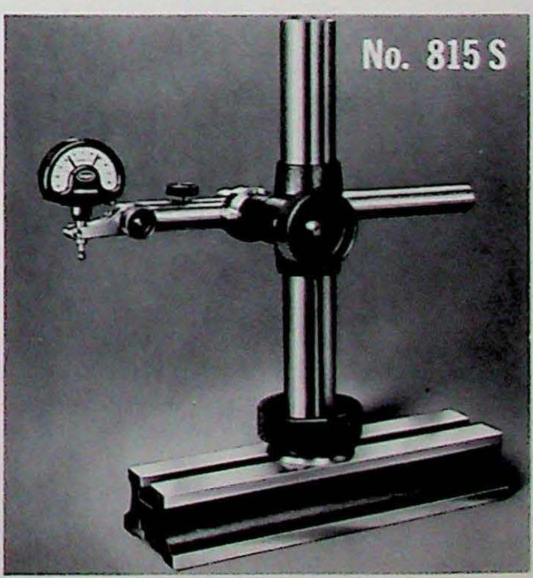
With fine adjustment, for Mahr Dial Indicators and Comparators.

Extremely heavy and ruggedly made. To be used when highest accuracy is required in using a comparator.

The surface of the H-formed base, the column and the extension arm are high precision ground. The column can be moved and clamped in any position on the base with a knurled nut. The fully adjustable extension arm is rigid and vibration-free. A fine adjustment permits zero setting of indicator without touching the indicator and without vibration.

Specifications:

Height overall (including base)	**16″**	**24″**	**35″**
Maximum horizontal extension		14″	
Length of base		12″	
Width of base		4″	
Diameter of column		1.575″	
Diameter of extension arm		1″	
Mounting bore for indicator		.315″	



Mahr MAGNETIC INDICATOR STANDS

No. 815 MG Indicator Stand "MAGNE-FLEX"

With adjustable gooseneck holding arm which permits rigid locking in any position.

The magnetic holding force is 100 lbs. The heavy base has an on- and off-switch. Two magnetic surfaces: end surface opposite from switch and V-angle bottom with 90° for placing on cylindrical shafts with diameter from 3/4" to 4 3/4", as well as on plane surfaces.

Specifications:

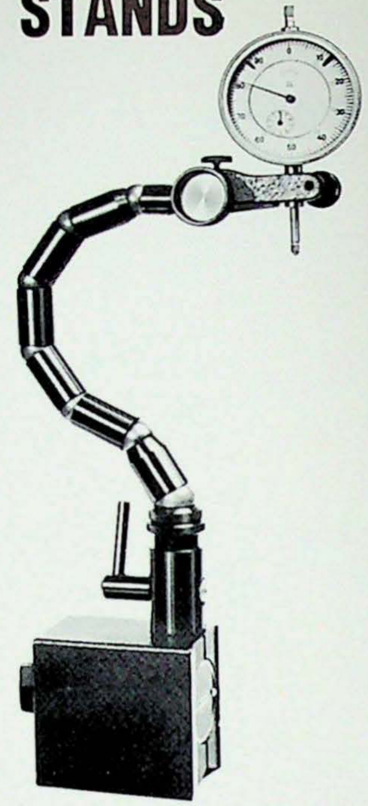
No. 815 MG

Overall height	13 3/4"
Dimension of magnetic base	2 3/4"x1 3/4" wide
Magnetic pull	100 lbs.
Mounting bore	3/8" I.D.
Weight	4 lbs.

The gooseneck holding arm consists of a series of bushings which are connected with each other by steel balls. Consequently, they function like a universal ball joint, offering nearly unlimited flexibility.

The mounting bore of the indicator holder is for 3/8" I.D. and will accommodate all Dial Indicators made to AGD specifications.

A fine adjustment permits most accurate setting of indicator. For the tightening of the cable tension a convenient adjustment has been provided.



No. 815 M Indicator Stand

With magnetic base and with FINE ADJUSTMENT.

Magnetic stand has on- and off-switch. The magnetic holding force is 100 lbs. Simple and quick setting is obtained by a new clamping of the extension arm, which guarantees absolutely rigid clamping even with moderate tightening.

The V-grooved base permits mounting of the stand on shafts with a diameter range 3/4"—4 3/4". Two types of indicator stands are available:

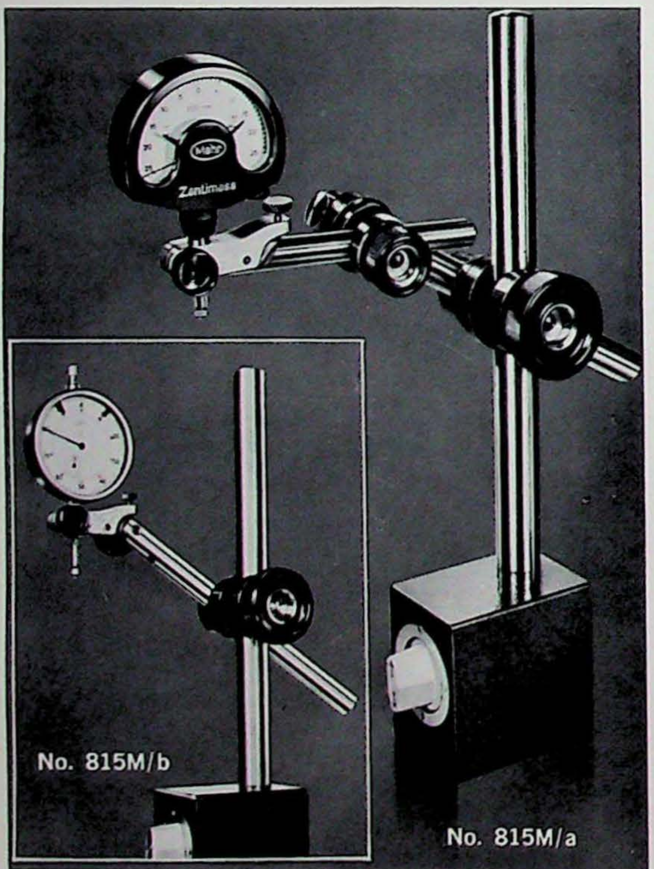
Specifications:

No. 815M/a with 2 double joints
No. 815M/b with 1 double joint

Height of column (incl. base)	11"
Length of base	2 3/4"
Width of base	1 3/4"
diameter of column	.710"
mounting bore	.375" (AGD)

When magnet is turned "ON," the base remains firmly clamped in any desired position without other clamping device; both hands are freed.

The mounting bore of the indicator holder is for 3/8" I.D. and will accommodate all Dial Indicators made to AGD specifications.



No. 815M/b

No. 815M/a

No. 815 P Indicator Stand with FINE ADJUSTMENT.

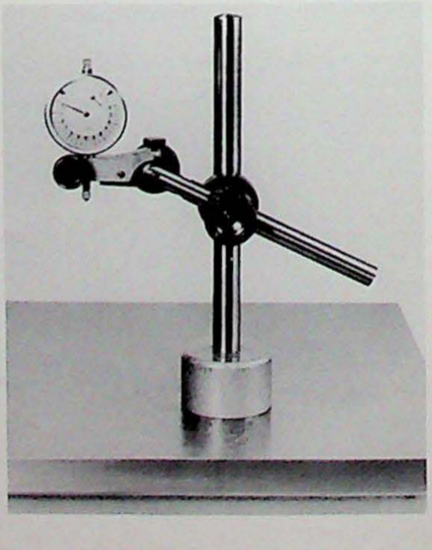
With round, sturdy MAGNETIC BASE. Suitable for "Puppitast" Universal Test Indicators and all models of MAHR Dial Indicators and Comparators.

Specifications:

No. 815 P

Height of column, including base	8"
Diameter of base	1 3/4"
Magnetic pull	22 lbs.
Mounting bore	.375"

The mounting bore of the indicator holder is for 3/8" I.D. and will accommodate all Dial Indicators made to AGD specifications.



Mahr SINE BAR, STRAIGHT EDGE, CYLINDRICAL SQUARE

No. 106 X SINE BAR

5" and 10"

For accurate setting or measuring of angles by means of gage blocks.

Hardened and ground and accurately lapped. The center to center distance of the measuring cylinders has been accurately adjusted to the length (L). The gage block length E for setting to an angle α can be calculated with the formula:

$$E = L \cdot \sin \alpha$$

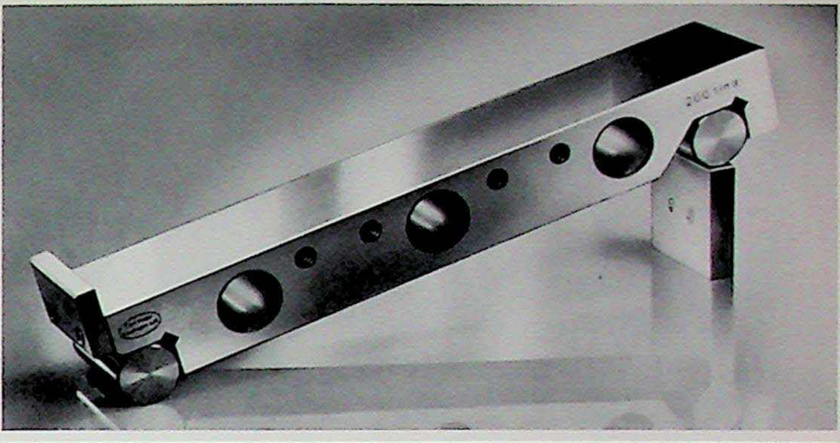
A removable flange on the bar provides a locating stop for the test piece.

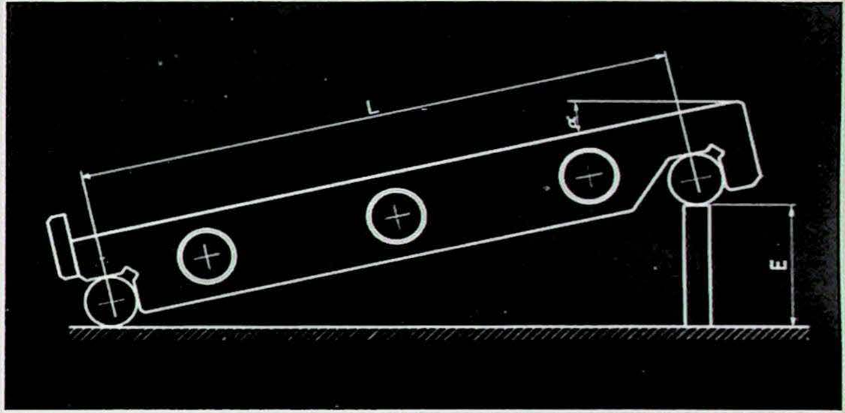
Length (L) center to center distance between measuring cylinders	5"	10"
diameter of measuring cylinders	3/4"	3/4"
Entire length	6"	11"
width	1 3/16"	1 9/16"

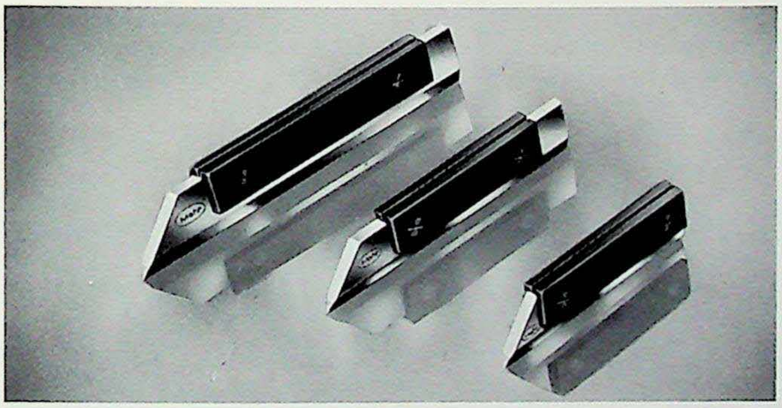
Black finished hardwood case optionally available

METRIC version available.

ACCURACY: Within .000010" per inch of length
Parallelism within .000025"







No. 104 H TOOLMAKERS KNIFE EDGE — STRAIGHT EDGE

For testing of straight surfaces, where extreme accuracy is required. Made of case hardened steel, hardened, tempered and provided with a carefully ground knife-edge by means of which the slightest inaccuracy in the tested surfaces may be easily determined. The shape combines ease of handling and high resistance against deformation. Thermally insulated handles prevent heat transfer from the hands.

Length	3"	4"	5"	6"	8"	12"	20"

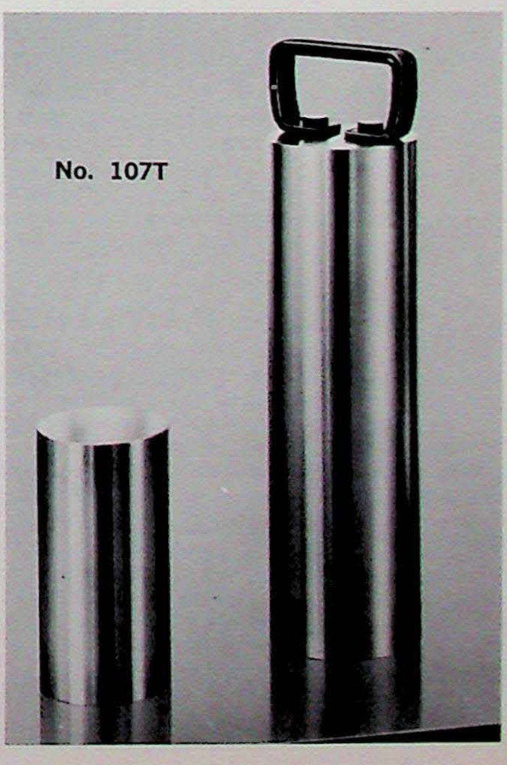
Furnished in black finished wooden case.

No. 107 T Cylindrical Square

MAHR cylindrical squares are made of hardened steel.
Angular accuracy $\pm .000028'' + \frac{H \text{ (height)}}{300000}$

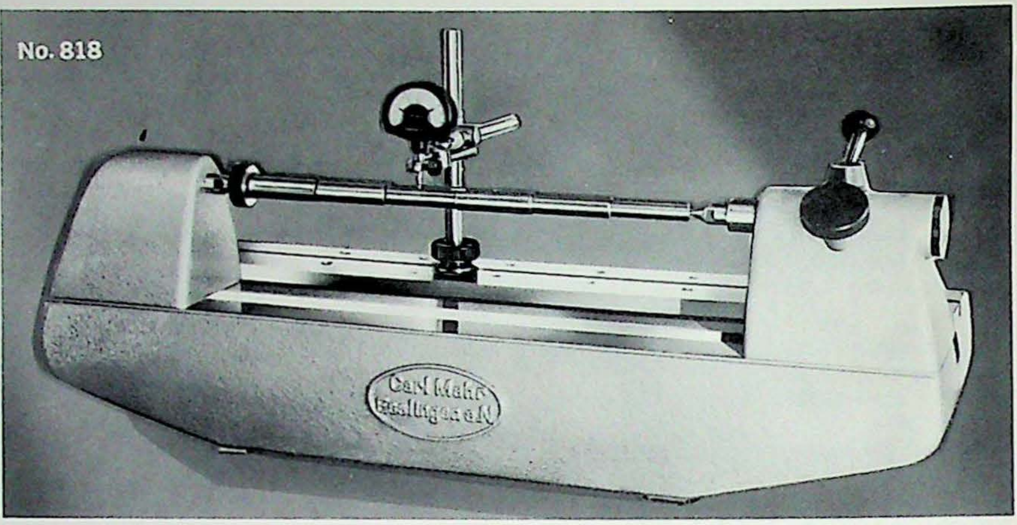
Cylindrical squares, used on cast iron or granite surface plates, provide one of the most reliable 90° reference standards available to industry today. Work may be placed against the periphery and sighted or the cylindrical square may be used for transfer type inspection.

Height	6"	12"	20"	28"
Diameter	3"	4"	6"	8"
Weight:	11	42	80	160 lbs.



Mahr BENCH CENTER AND HARDENED V-BLOCK

No. 818 Bench Center

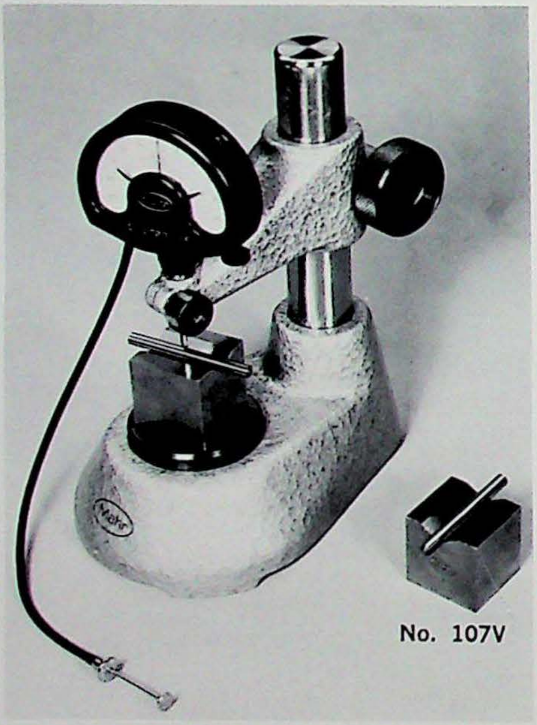


of extremely rigid construction. MAHR Bench Centers offer a fast, accurate method of inspecting cylindrical and tapered work for runout. The headstock can be adjusted lengthwise and locked securely in any position by a knurled knob. Headstock and tailstock rest by their rear edges against a sturdy precision ground straight edge, assuring correct alignment of the centers at any point. The spring loaded center of the headstock can be retracted by a convenient lever. At the limit of its backward movement the center is held by its own automatic lock. In the T-slot of the straight edge, one or more Indicator Stands No. 815 (without base as illustrated) can be mounted.

Specifications: No. 818

Maximum distance between centers	16″	28″	52″
Height of centers	4″	4″	10″
Weight approx.	110	154	660 lbs.

The straight edge, due to its wide surface can also hold the Indicator Stands with magnetic base (catalog No. 815 M, refer to catalog page 30) to good advantage.



No. 107V

V-Block No. 107 V

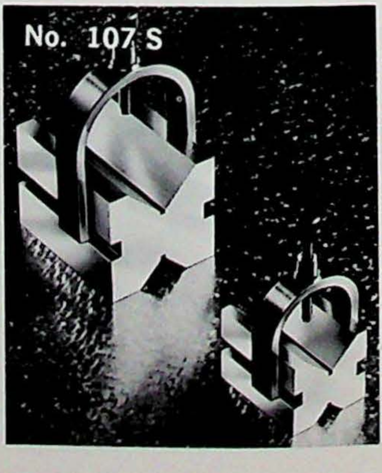
For checking cylindrical work for diameter, out-of-round and taper.

Carefully hardened, tempered, precision ground and lapped. Parallelism of the "V" to base and difference of height of V-blocks when furnished in matched pairs, accurate within .000080″.

Dimensions	1 3/16″x1 3/16″x1 3/16″
V-Angle	108°
Range of diameters accommodated	.080″—1″

These V-Blocks are also available in matched pairs.

No. 107 S V-Blocks



Made of steel, hardened and precision ground with clamp.

The V-Blocks have two V-angles of different size to take parts of varying dimensions. By means of the clamp the work can be held tight in the block. The accuracy for parallelism of the "V" with the bottom, its squareness to the two end faces, and the maximum permissible variation in height between two V-Blocks in a pair, is within .00012″.

Specifications: **No. 107 S**

Clamping range	**inches**	**3/16—1-3/16**	**1-3/16—2**
Length	inches	2	3
Width and height	inches	1-9/16 × 1-9/16	2 3/8 × 2 3/8

These V-Blocks are also available in matched pairs.

Mahr MAGNETIC V-BLOCK, MAGNE SQUARE

No. 107 MH Permanent Magnetic V-Block

With Hardened Surfaces and V-Angles

For cylindrical and plane work, with on- and off-switch.

Suitable for many purposes in toolmaking and inspection for measuring and layout work in quality control and toolroom. Ideal for work which requires most accurate positioning, as for instance in the setting up of targets in autocollimation or in precision grinding, etc.

This Magnetic V-Block is equipped with laminated hardened steel plates on its V- and contact-surfaces, making them extremely wear resisting. Since these laminated hardened steel plates are relatively thin and closely mounted, the effectiveness of the on and off-permanent magnet, which is built into the soft iron magnet housing, is in no way diminished. Thus the measuring and holding device fulfills the important requirements of high magnetic pull and high wear resistance.

Three magnetic surfaces: Top and bottom each with 90° V-angle and end surface opposite from switch. (When turned "on", all three magnetic surfaces are activated simultaneously.)

ACCURACY for flatness, parallelism and squareness is within .0002".

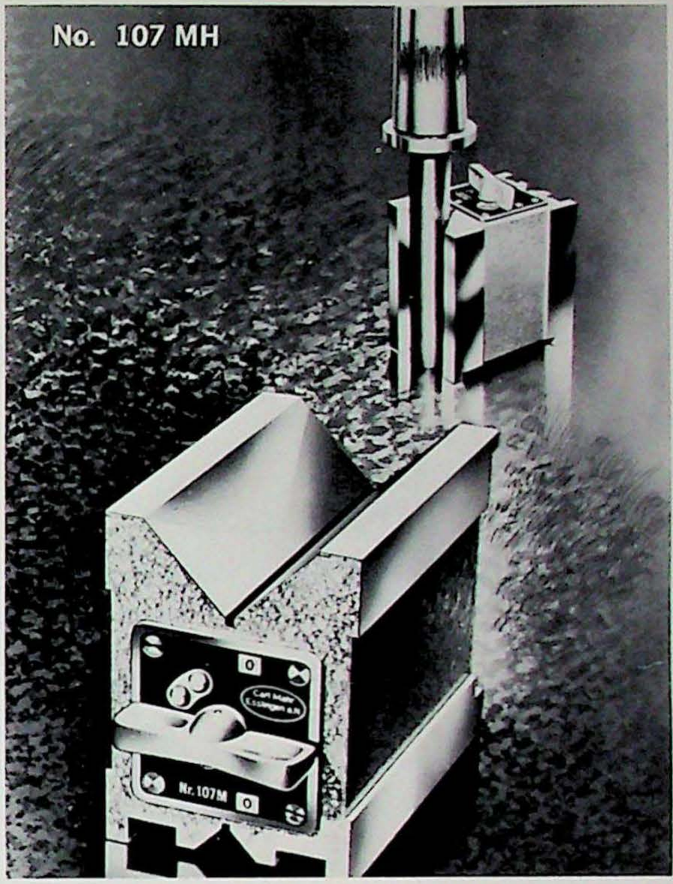
Specifications: No. 107 MH

Clamping diameter range	3/16" to 2½"
Length	4"
Height	3¾"
Width	2¾"
Magnetic pull on plane surfaces approximately	220 lbs.
Magnetic pull on V-surfaces approximately	165 lbs.

Including black finished wooden case.

These V-Blocks are also available in matched pairs.

No. 107 M same as No. 107 MH, but holding surface and V-angle NOT hardened.



No. 4010 Magne Square

HIGHEST PRECISION STEEL SQUARE WITH MAGNETIC V-ANGLES

This high-precision Steel Square has permanent magnetic V-angles and offers an excellent aid for angular measurements in toolmaking and general machine shop work.

It differs from all conventional squares by the connection of the measuring blade to the beam through magnetic adherence. For the attachment of the measuring blade, the beam has V-shaped 60° angular recesses, precision ground and square to the affiliated sides, which place the measuring blade precisely into central position. The magnetic pull is effective over the entire length of the beam surface and assures satisfactory measuring. Dislocation of the blade is impossible.

The blade has round cross-section. This results in a close, linear alignment as in knife-edge blades for best measuring results.

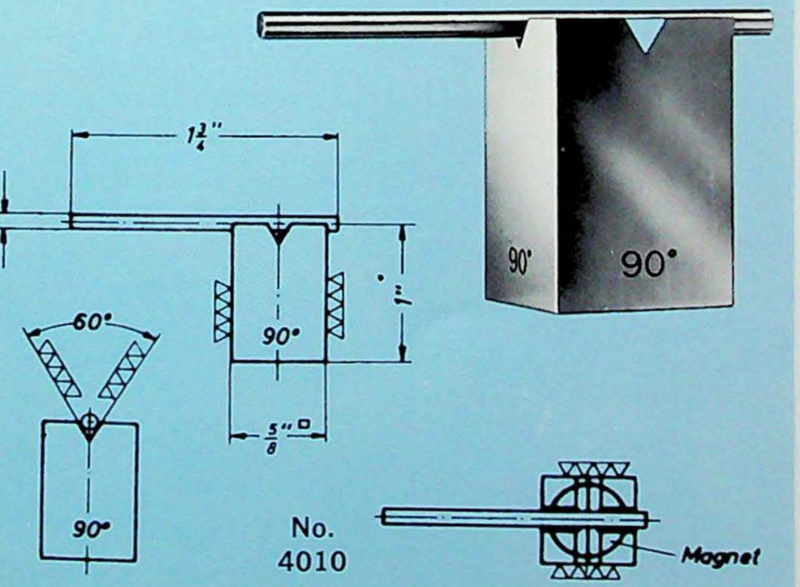
By moving the measuring blade along its axis it is possible to measure angles over short or long distances. These Precision Squares are made of hardened and tempered special steel, carefully ground and accurately lapped.

Any two sides opposite each other are parallel and also at right angle to their adjoining 60° V-groove. There is no guarantee for accuracy of the squareness of the two V-grooves and the two sides joined to each other, nor for the parallelism of top and bottom.

ACCURACY:

Angular Accuracy within .0002" on 1³⁄₁₆" length of measuring blade. Parallelism within .000040" between two opposing sides.

This extreme accuracy offers a great variety of uses. To align a mirror in an optical projector becomes a simple routine matter, namely by focusing the shadow of the beam. When employing Optical Projectors and Toolmaker Microscopes, delicate pieces of work may be held by the magnetic force of the square, avoiding expensive holding fixtures.



No. 4010

EXTREMELY ACCURATE

Angular Accuracy within .0002" on 1³⁄₁₆" Length of Measuring Blade Parallelism within .000040" between 2 opposing sides.

Mahr SMALL SELFCENTERING BORE GAGES

Here is a NEW concept of an Internal Comparator

The accurate measuring of bores is much more difficult than taking outside dimensions as shown here:

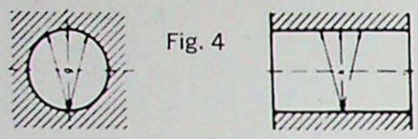


Fig. 4

It is necessary to find simultaneously the maximum distance (g) at right angles to the axis and the minimum distance (k) along the axis as shown in fig. 4.

MAHR Bore Gages have the distinct advantage of reliable automatic centering inside the bore to be measured and provide a fast and reliable check for dimensions and shape.

Guaranteed Accuracy .000050″

1. Introduce into bore
2. Rock in the bore
3. Read the dial

That is all!

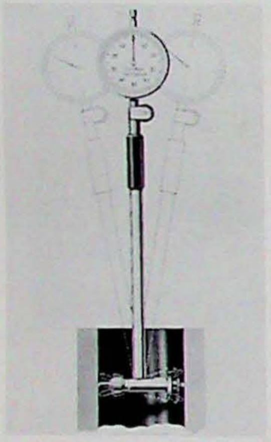


Fig. 5

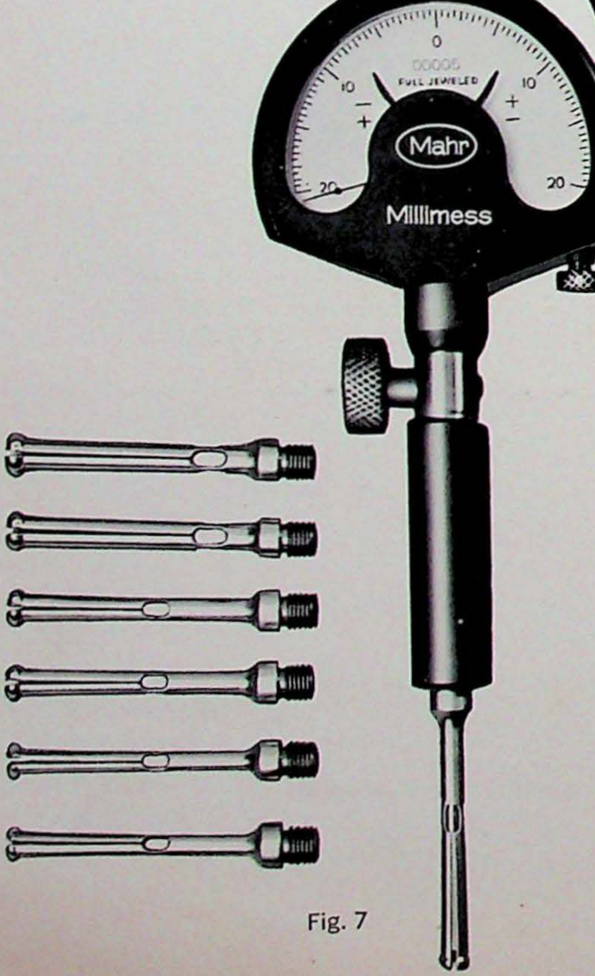


Fig. 7

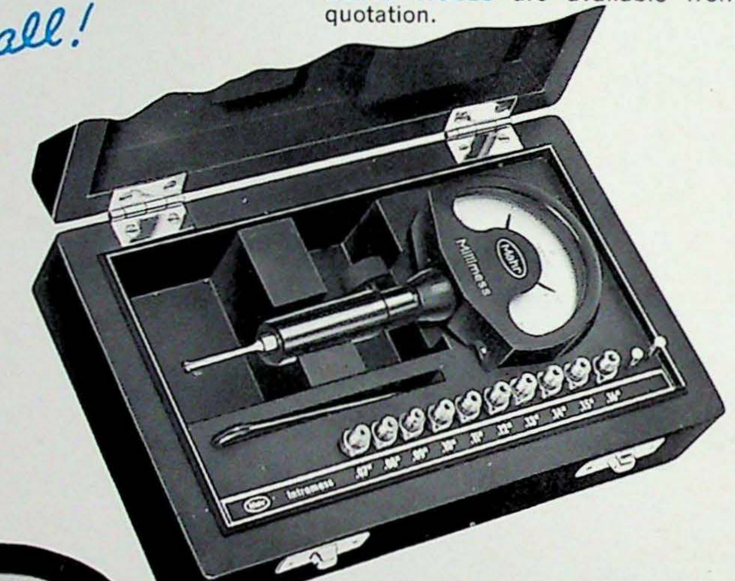
MAHR Small Bore Gages

start for diameters of .0185″ and are available in the following ranges:

.0185″ to .038″	.160″ to .280″
.038″ to .060″	.280″ to .400″
.060″ to .160″	.400″ to .720″

They employ interchangeable spring loaded splitball measuring heads which transfer their movement over a tapered precision lapped expanding pin to the Precision Comparator, as shown in fig. 6. Measuring heads are hard chromed for maximum wear. Sizes from .160″ up can be furnished TUNGSTEN CARBIDE tipped. Request prices.

Special measuring heads for shallow bores and bottom of BLIND HOLES are available from ,070″ to .700″. Request quotation.



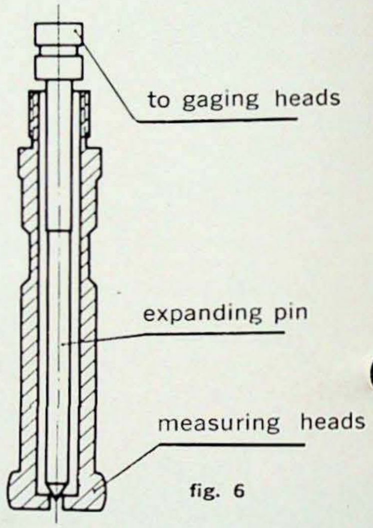


fig. 6

No. 844 Small Mahr Selfcentering Bore Gages

Ranges .0185″ to .720″, with supersensitive comparator gaging heads reading directly in **.000020″, .000050″, .0001″ or .0005″.**

Mahr Small Bore Gages have interchangeable spring-loaded split-ball measuring heads, which are hard chrome plated for maximum wear. Tungsten carbide tipped measuring heads are optionally available, starting at .160″. (Ask for prices.)

Specifications:

Range:	Bore depth	Range of each probe	Number of probes in set
.0185″ - .038″	1/16″ - ⅛″	.0018″ - .004″	6
.038″ - .060″	½″	+.004″ - .002″	5
.060″ - .160″	¾″ - 1″	±.010″	10
.160″ - .280″	1 9/16″	±.012″	7
.280″ - .400″	1 9/16″	±.012″	7
.400″ - .720″	1⅞″	±.024″	9

Each set is furnished in black hardwood case but **without** comparator gaging head.

Select Precision Comparator from pages 14-15 or select Dial Indicator from pages 12-13. MAHR Precision Comparators and Dial Indicators are interchangeable in the various ranges which are specified above. Each gage will therefore meet **all** tolerance specifications.

Metric ranges available.

Setting of MAHR small Bore Gages can be accomplished with standard ring gages, Snap Gage or Micrometer setup with gage blocks.

Blind holes: Special interchangeable measuring heads for shallow bores and bottom of blind holes can be furnished in the following ranges: **.070″** to **.700″** Request quotation.

SELFCENTERING BORE GAGES

No. 844 aw Right Angle Attachment

To fit all small MAHR Bore Gages from .0185″ to .720″. (Refer to Fig. 8.)

A most practical and economical accessory for the checking of bores in hard-to-get-at places. Screw into gage holder and check small bores without removing work piece from underneath bore spindle. One or more extensions #844 vl as shown in Fig. 10 can be added, if greater bore depth is desired.

Specifications:

No. 844 aw Right Angle Attachment to fit all ranges from .0185″ to .720″.

No. 844 vl Extension for deep bores

For the checking of deep bores beyond the specified bore depth of our small Bore Gages. They may be used for ranges starting at .320″ up to .720″. Each extension will add 2½″ bore depth to the standard bore depth of each Bore Gage. Several of these extensions may be added to one Bore Gage to achieve desired bore depth. Each extension is a selfcontained unit as shown in Fig. 10. The transfer movement to the comparator operates frictionless assuring highest sensitivity and guaranteeing accuracy even if several extensions are used in one set-up. They may also be used in connection with Angle Attachment No. 844 aw.

Specification:

No. 844 vl Extension for Small Bore Gages to fit all ranges from .320″ to .720″.

Small Bore Gages for ranges from .180″ to .320″ can be furnished with one or more extensions, 2½″ long for deeper bores TO SPECIAL ORDER. They require also special gaging pins and special measuring heads. REQUEST PRICES. Please specify required BORE DEPTH and bore diameters.

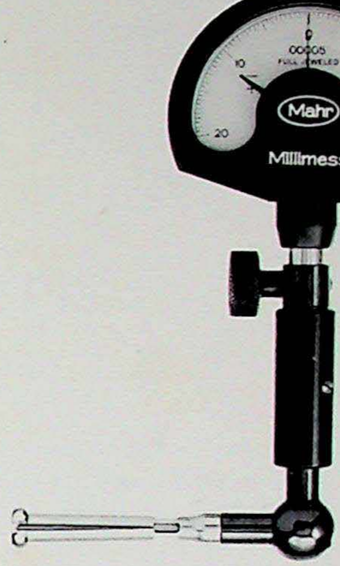


Fig. 9

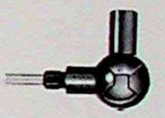


Fig. 8

Right Angle Attachment No. 844 aw
To fit all small Bore Gages range .0185″ to .720″.

Fig. 10

Extensions No. 844 vl
For deep bores, to fit all small Bore Gages range .320″ to .720″.

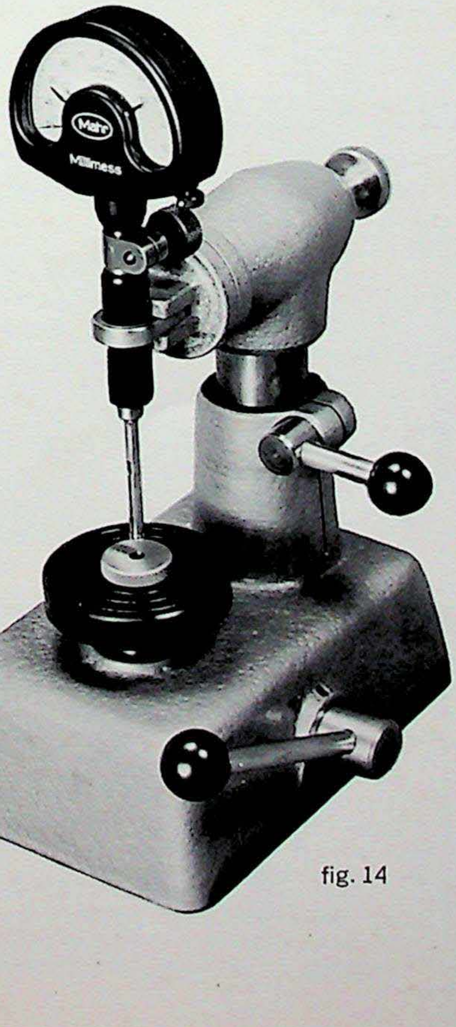


fig. 14

No. 844 st Precision Comparator Stand

For use with MAHR small Bore Gages #844, for ranges up to **.720″.**

This practical stand will speed up inspection of mass produced parts. Very rugged construction with hardened and ground table; with lever for raising or lowering of table. The hardened platform table can be raised by approximately 1⅛″ by lever for bringing workpiece into gaging position. It is possible to clamp the platform table securely at any height which is most practical when gaging a bore for out-of-round errors.

For permitting the gaging of workpieces of large external dimensions, the vertically adjustable horizontal arm for holding the bore gage may be swivelled around its longitudinal axis by 45° and 90°.

Throat depth of horizontal arm	1¾″
Diameter of platform table	2⅜″
Travel of platform table	1⅛″
Maximum working height approximately	4″
Weight	11½ lbs.

Mahr LARGE SELFCENTERING BORE GAGES

No. 844 Large Mahr Selfcentering Bore Gages

Ranges .700" to 32.000 inches.

With super sensitive comparator gaging heads reading directly in **.000020", .000050", .0001" or .0005".**

MAHR large Bore Gages employ a spring loaded centering bridge and have a patented linkage system operating practically without friction (see fig. 13). Interchangeable measuring anvils and spacer washers are furnished with each set for obtaining the following ranges:

Range	Bore Depth
.700" to 1.400"	6¾"
1.400" to 2.400"	8"
2.000" to 4.000"*	10"
4.000" to 6.400"	12"
6.400" to 10.000"	16"
10" to 16"	20"
16" to 32"	40"

*An extension for the 2"-4" set will increase the range to 6".

Each set is furnished in black hardwood case but without comparator gaging heads. Select Precision Comparators from pages 14-15 or select Dial Indicator from pages 12-13. MAHR Precision Comparators and Dial Indicators are interchangeable in the various ranges which are specified above. Each gage will therefore meet **all** tolerance specifications.

METRIC ranges are available.

Tungsten Carbide

MAHR Large Bore Gages are also carried in stock with tungsten carbide tipped measuring anvils and tungsten carbide tipped built-in sensitive anvils.

Specify "Tungsten Carbide" and refer to respective price specifications in price list.

Short Shaft Bore Gages

MAHR Large Bore Gages are also carried in stock with exceptionally short shaft in ranges from .700" to 6.400". Refer to respective price specifications in price list. Prices for larger ranges on request. Specify requirements.

Outstanding Features of MAHR Selfcentering Bore Gages

MAHR Bore Gages have a patented linkage system operating practically without friction. As shown in fig. 13, the movement of the built-in moveable anvil is transferred to the comparator head free from play and error over a transmission lever and pointed rods which function frictionless within bearings. The transmission rod is easily accessible for cleaning purposes by removal of the centering bridge.

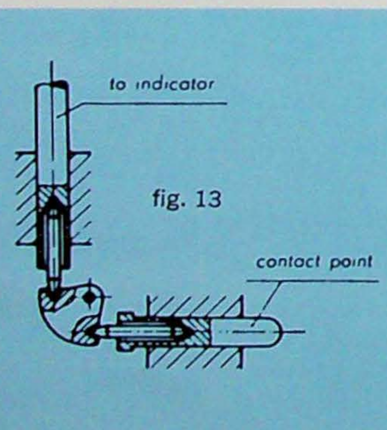


fig. 13

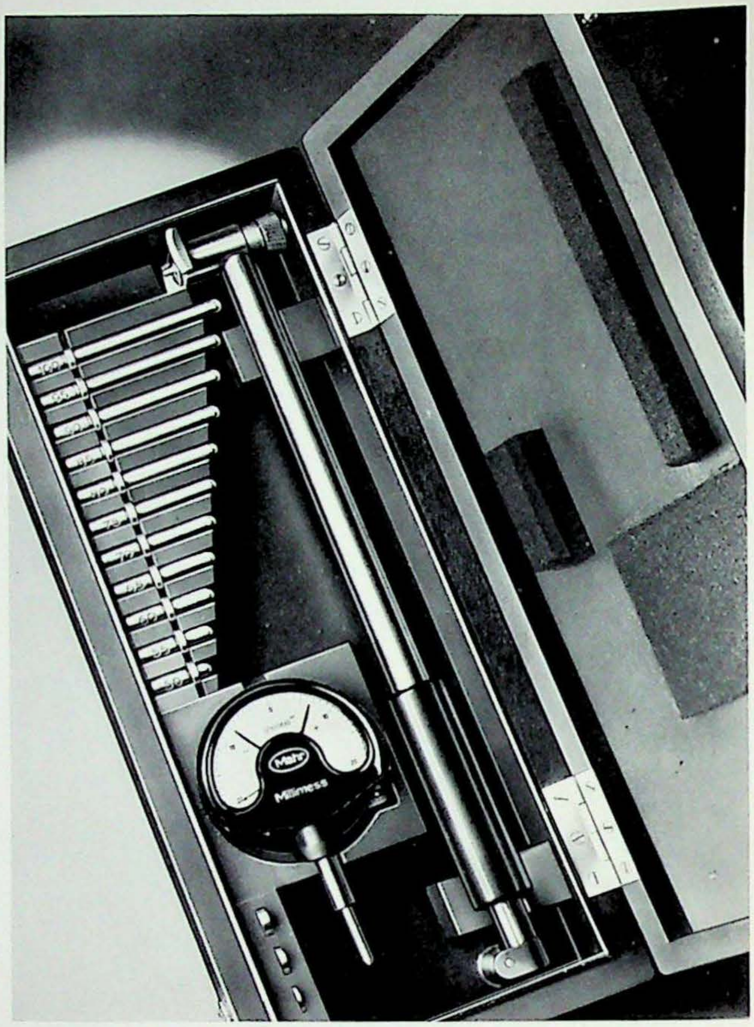


Fig. 11

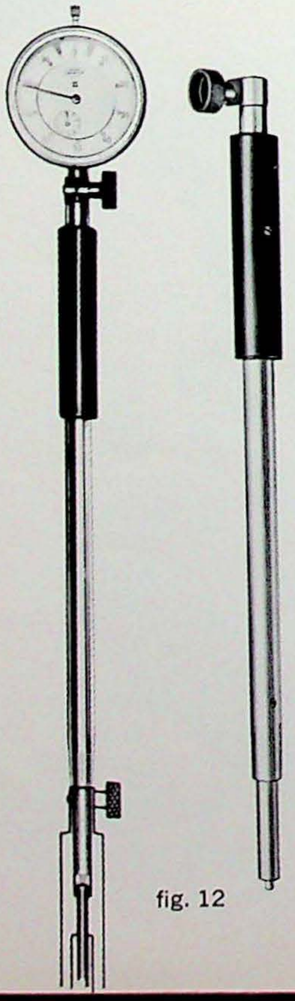


fig. 12

Extensions for DEEP Bores

are available for large Bore Gages in various lengths. Several of these extensions may be added to one Bore Gage, to achieve the desired bore depth.

Each extension is a self-contained unit as shown in fig. 12 and is furnished in a black finished hardwood case.

These extensions are inserted between Bore Gage Holder and Comparator.

Specifications:

Extensions No. 844 vl for large Bore Gages No. 844 suitable for Bore Gage ranges:

	adding bore depth of:
.700" to 4.000"	10" 20" 40"
4.000" to 32.000"	10" 20" 40" 80"

include black finished hardwood cases.

Mahr SELF-CENTERING BORE GAGES

No. 844 A Mahr Selfcentering Bore Gage

Ranges .700" to 6.400", with supersensitive comparator gaging heads, reading directly in **.000020", .000050", .0001" or .0005".**

With Right Angle Shaft

For the measuring of bores at hard-to-get-at places.

Construction is the same as for No. 844 Selfcentering Bore Gages described on page **36.** This model is available in the following ranges:

Specifications:

Range	.700"-1.400"	1.400"-2.400"	2"-4"	4"-6.4"
Length of shaft	2.8"	3"	4"	4"
Length of right angle shaft	2"	2.4"	3"	3.6"
Maximum bore depth	1.2"	1.4"	2"	2.2"

Each set is furnished in black hardwood case but **without** comparator gaging head. Select Precision Comparator from pages 14-15 or select dial indicator from pages 12-13.

Mahr Precision Comparators and Dial Indicators are interchangeable in the various ranges specified above. Each gage will therefore meet **all** tolerance specifications.

METRIC ranges available.

Tungsten Carbide:

On request, we will furnish the interchangeable measuring anvils as well as the built-in sensitive anvil tipped with TUNGSTEN CARBIDE. Specify "TUNGSTEN CARBIDE," if desired, and refer to respective price specification in price list.

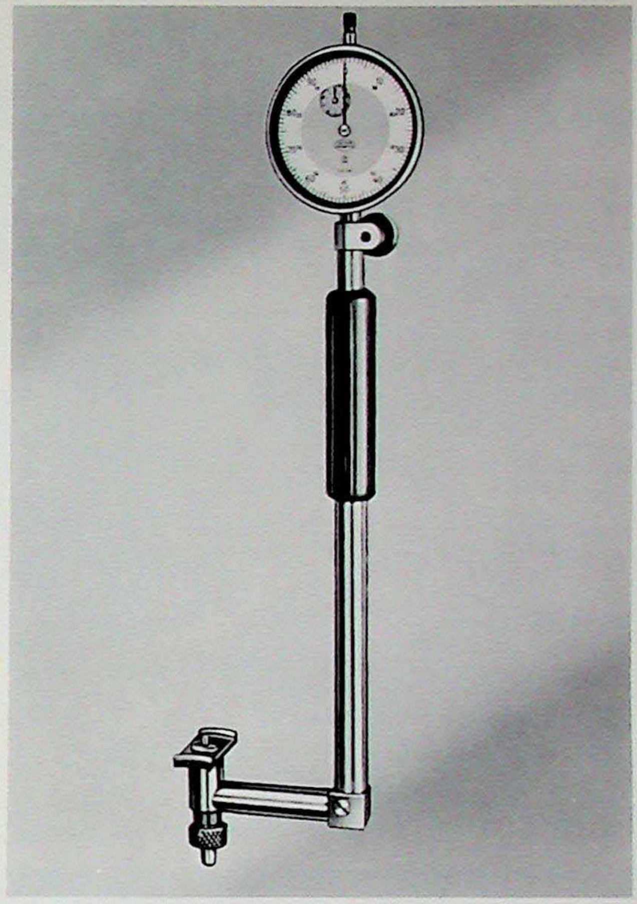
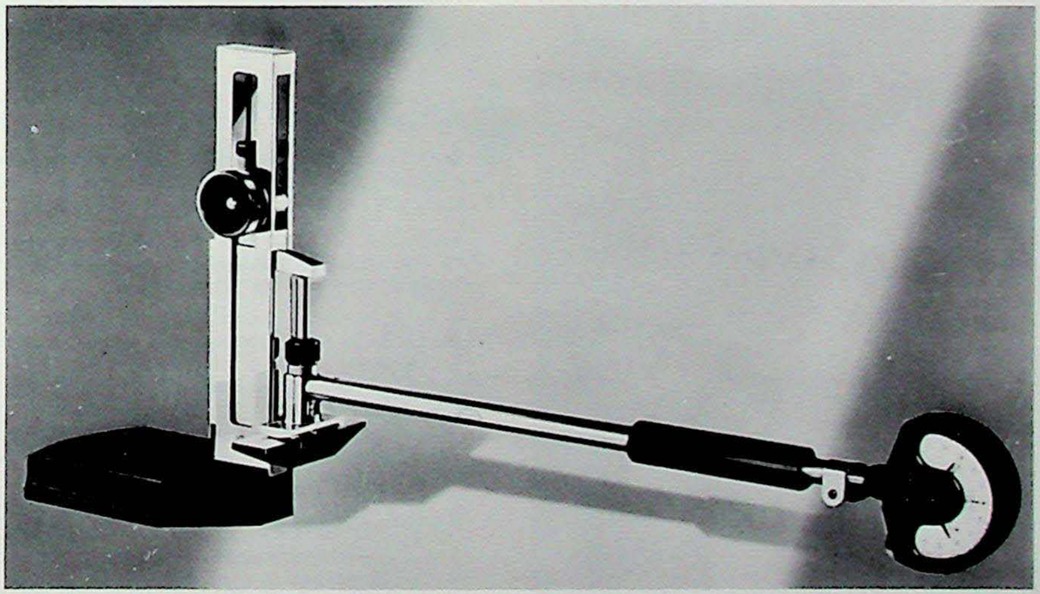


Fig. 15



No. 844 ev Bore Gage Setting Device

for large MAHR Bore Gages #844, offers the best method of setting Bore Gages to the inside diameter to be checked, by using standard gage blocks. This setting device has distinct advantages over former types now on the market. The gage blocks can be quickly inserted and removed for changing the dimensions without removing the holder. This unit consists of a heavy base, which is hardened, ground and accurately lapped. It is extremely rigid. Gage block holders of various lengths, with capacity up to 32", can be firmly locked to the base block by screw from bottom of base. The gage blocks are clamped between an upper and a lower jaw. The lower jaws have an elevated platform for resting the selfcentering bridge of the bore gages simulating actual working condition while gaging a bore. Lower measuring jaws have to be selected for various ranges.

Specifications:

Bore Gage Setting Device #844 ev, consisting of:

Lower measuring jaw suitable for bore gage range .700" to 1.400" 1.400" to 6.400" 6.400" to 16.000" 16" to 32"	Gage Block Holder capacity 0"- 4" 4"- 8" 4"-16" 16"-32"
Upper measuring jaw suitable for all capacities.	Base, extra heavy, hardened, ground and accurately lapped for use with gage block holders of all capacities.

No. 844 B Over-the-Bar Bore Measuring Instrument

For inside measurements without removing the boring bar or grinder spindle from the bore.

The construction of this instrument is identical with our Bore Gages No. 844 (page 36). It has a selfcentering action in the bore at right angles to the axis. By means of a spring loaded bridge, the ends form an equal-sided triangle with the fixed anvil. Setting to standard ring gages or our Setting Device No. 844 ev (page 37) is a fast and simple procedure.

This Bore Measuring Instrument will report most accurately the progress of boring without disturbing the machine set-up, and the enlarging of a bore to the exact size desired is easily accomplished. When taking the measurements it is not necessary to remove the bar from the bore.

We recommend the use of our Comparator No. 100Z or Dial Indicator No. 811ST with this instrument, for reading in .0005″.

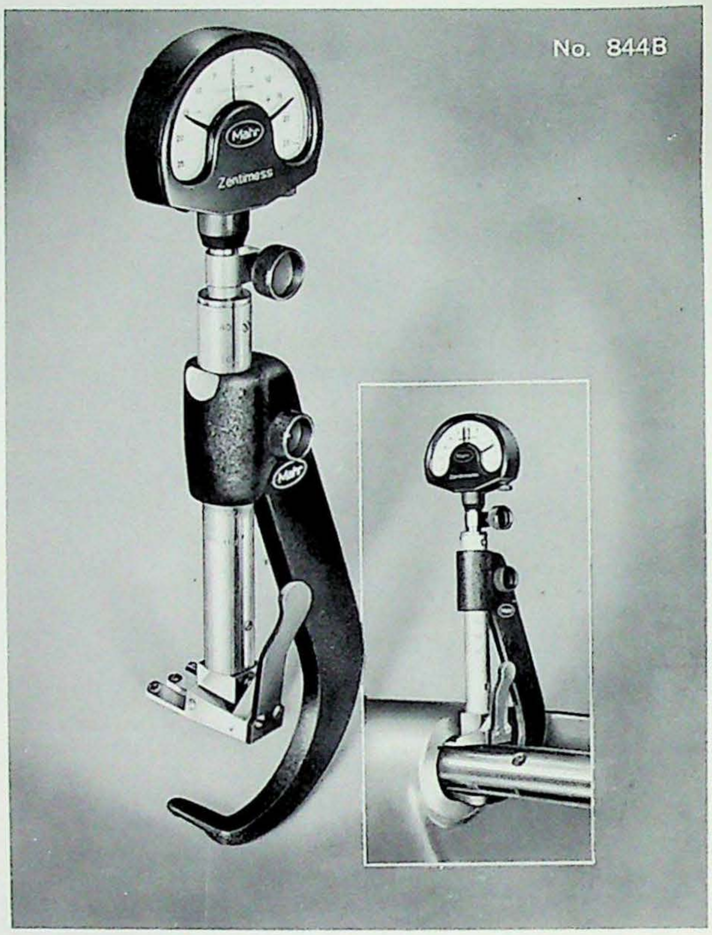
Specifications:

Measuring range	**1.400″-4.400″**	**4″-8″**
Reach of jaws into bore	5/8″	3/4″
Minimum diametrical difference between bore and boring bar	−.400″	−1.200″

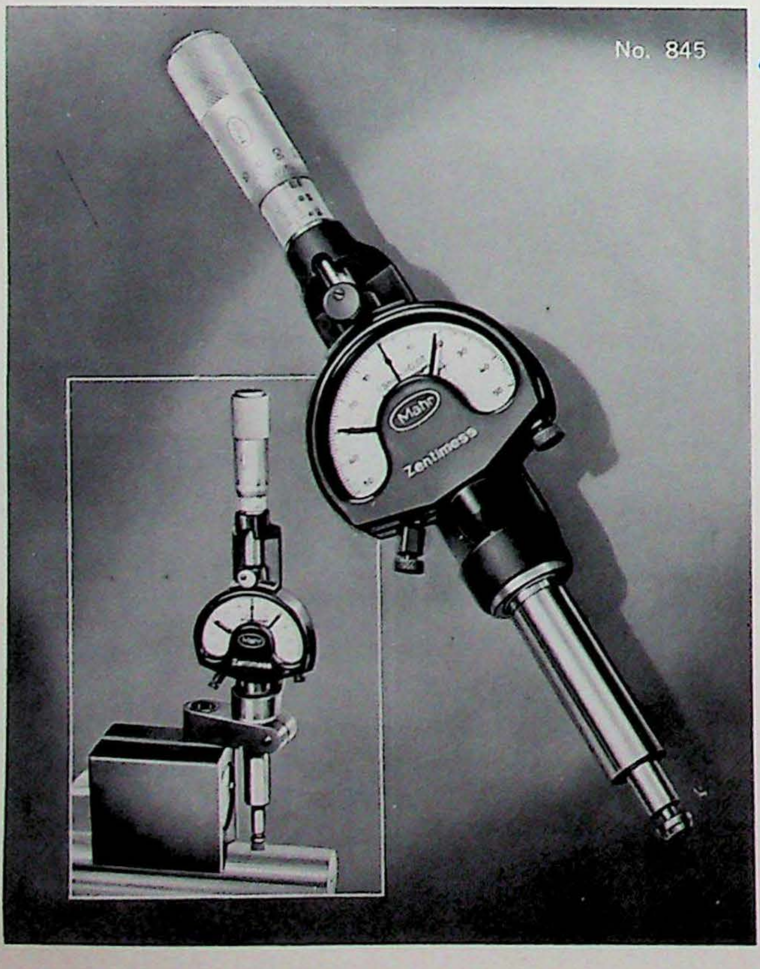
including black finished hardwood case but without gaging head.

Select Precision Comparator from pages 14-15 or select Dial Indicator from pages 12-13.

METRIC available.



No. 844B



No. 845

No. 845 Boring Tool Setting Device

With satin chrome finished micrometer head and Precision Comparator reading in .0005″ or .000050″. Measuring anvil tungsten carbide tipped.

This tool is used for the rapid setting of the boring tool bit to the exact bore diameter on boring mills and other machine tools with rotating boring bars.

It is fastened with its mounting shank in a radial position with respect to the boring bar. The comparator may be moved radially by means of the micrometer. The distance between the face of the measuring anvil when set against the cutter bit, and the center of the boring bar equals ½ of the boring diameter. The divisions of micrometer and comparator are graduated in such a way that the bore diameter rather than the radius is read and set directly.

Specifications: No. 845 Boring Tool Setting Device.

Measuring range in terms of the diameter	2″
Length of mounting shank	2″
Diameter of mounting shank	.590″

By moving the tool on the mounting shank of 2″ length, the measuring range may be increased to 4″.

Including wooden case.

If the device is not fastened to the machine but is to be fastened directly on the boring bar for setting (as shown in insert), we can supply as follows:

No. 845M Magnetic Base

With accurately ground Vee for boring bar diameter from ¾″ to 4¾″.

This base has a mounting device for the tool No. 845 and is securely held to the boring bar by the permanent magnet, namely that the carbide tipped contact pin is above the boring bit.

METRIC available.

Mahr BORE MEASURING INSTRUMENTS

No. 844 V Indicating Plug Gage

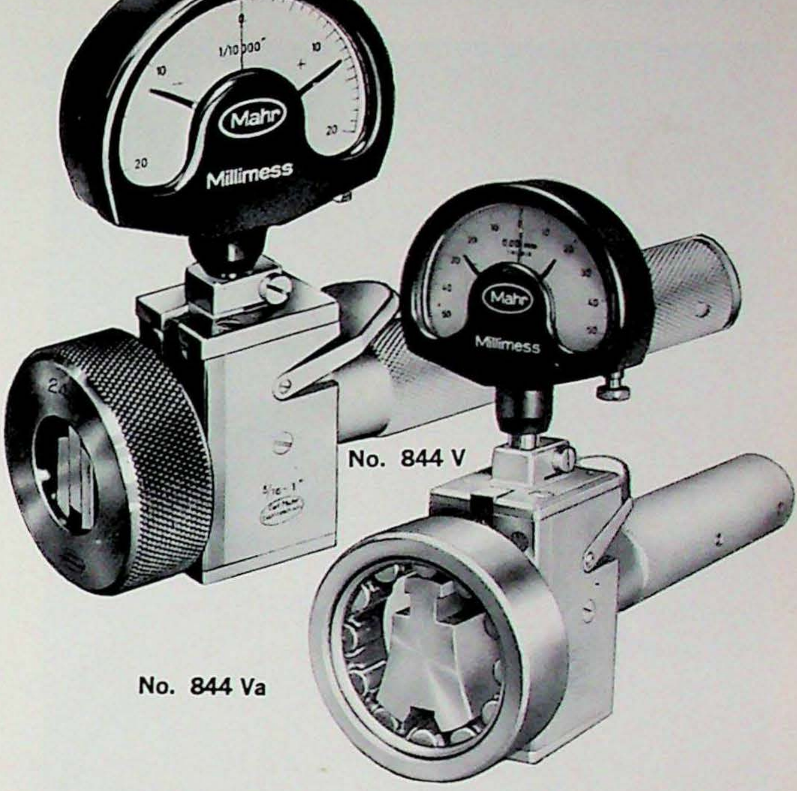
Ranges **.080″ to 4.800″**, with interchangeable measuring segments, and with supersensitive comparator gaging heads reading in **.000020″**, **.000050″**, **.0001″** or **.0005″**.

This measuring device is actually an **ADJUSTABLE** Plug Gage which accomplishes inspection of the highest accuracy for GO and NO GO in ONE operation.

It consists of three flat measuring segments, two of which are fastened to the gage body, while the third one in center can be moved between the two outer fixed segments by means of a thumb lever. With the center member retracted, the gage is inserted into the bore and centers itself inside automatically upon release of the thumb lever. The motions of the center member are transmitted to a comparator head which tells the position of the two outer segment members at each gaging. The center member is fastened to a slide which moves on bearings free of play and virtually frictionless. With the segments **contacting the work only after placing it in measuring position,** there is **practically no wear** and the segments have an almost unlimited life as compared to fixed gages. They are interchangeable and work within a certain measuring range. They can be interchanged for segments of another range just by a few turns of a screw driver.

Out-of-round conditions can be detected by revolving the gage inside the bore.

The Gage is set to a standard Ring Gage. Coarse setting is done by adjusting the comparator shank in its mounting. Fine setting is by means of the adjusting knob on the lower right side of the Comparator Housing.



No. 844 V

No. 844 Va

Specifications:

No. 844 V Indicating Plug Gage.
Measuring range:
.080″-.200″ .200″-1.030″ 1.030″-2.050″ 2.050″-4.800″

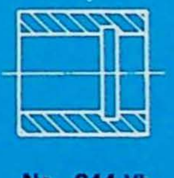
including black hardwood case, but **without** measuring segments and **without** comparator gaging head. Select Precision Comparator from pages 14-15. Select Measuring Segments from the following specifications.

No. 844Vm Interchangeable Measuring Segments, each set consisting of 3 pieces.

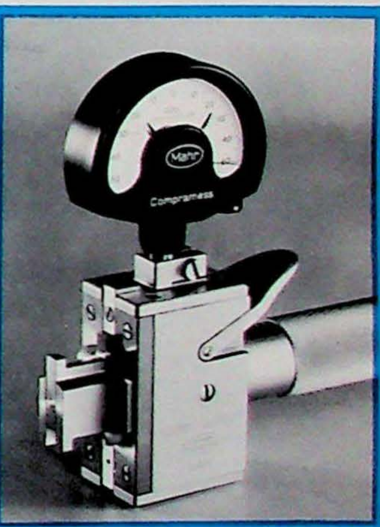
Range	Length	Range	Length	Range	Length
.080″ to .100″	5/32″	.400″ to .480″	5/8″	1.620″ to 1.810″	1-3/4″
.100″ to .130″	5/32″	.480″ to .600″	3/4″	1.810″ to 2.050″	1-3/4″
.130″ to .160″	3/16″	.600″ to .720″	1″	2.050″ to 2.370″	2″
.160″ to .200″	1/4″	.720″ to .880″	1-1/4″	2.370″ to 2.680″	2″
.200″ to .260″	5/16″	.880″ to 1.030″	1-7/16″	2.680″ to 3.000″	2-3/8″
.260″ to .320″	3/8″	1.030″ to 1.220″	1-9/16″	3.000″ to 3.300″	2-3/8″
.320″ to .400″	1/2″	1.220″ to 1.420″	1-9/16″	3.300″ to 3.600″	2-3/8″
		1.420″ to 1.620″	1-3/4″	3.600″ to 4.000″	2-3/8″

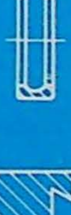
This gage may be successfully adapted for many special measuring applications such as dovetail ways, grooves, recesses and bearing races by using segments made to specifications for the job.

Request quotation for special measuring segments. Please submit drawings of work to be checked or furnish sample.

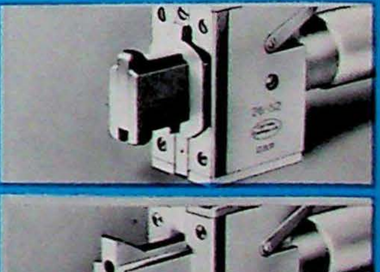


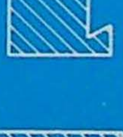
No. 844 Vb



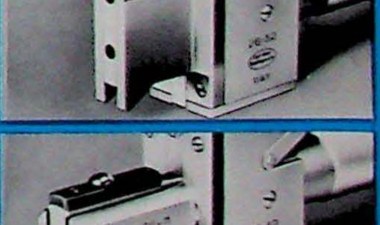


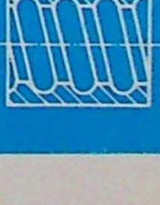
No. 844 Vc



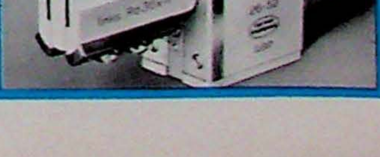


No. 844 Vd



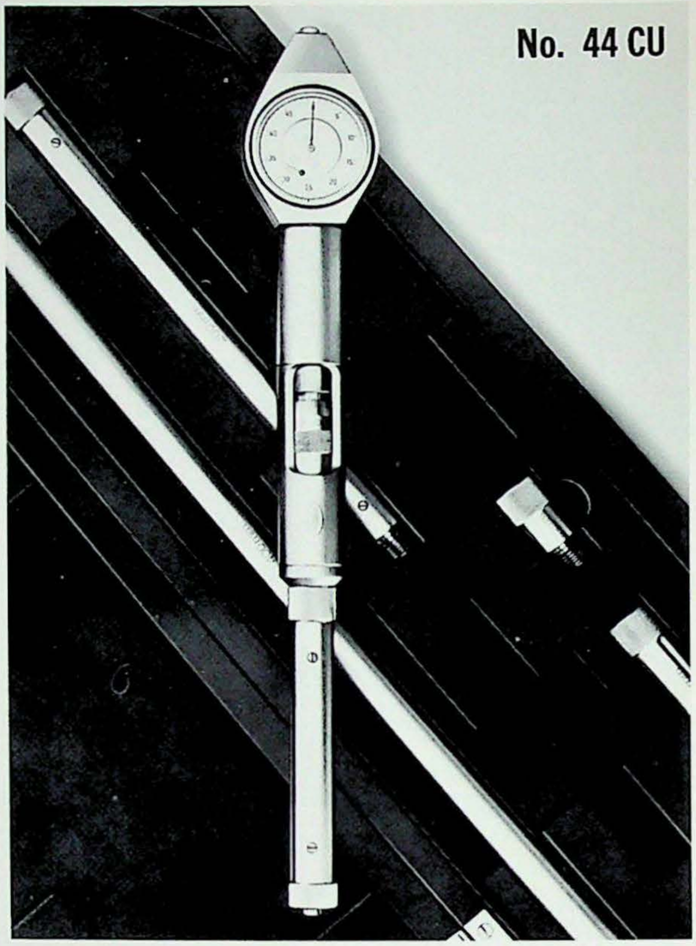


No. 844 Ve



Mahr BORE MEASURING INSTRUMENTS

No. 44 CU Indicating Inside Micrometer



with built-in dial indicator No. 803 STZ and extension-combinations

dull chromed

hardened spindle

lead screw precision ground

measuring faces and contact tips of extensions tungsten carbide tipped

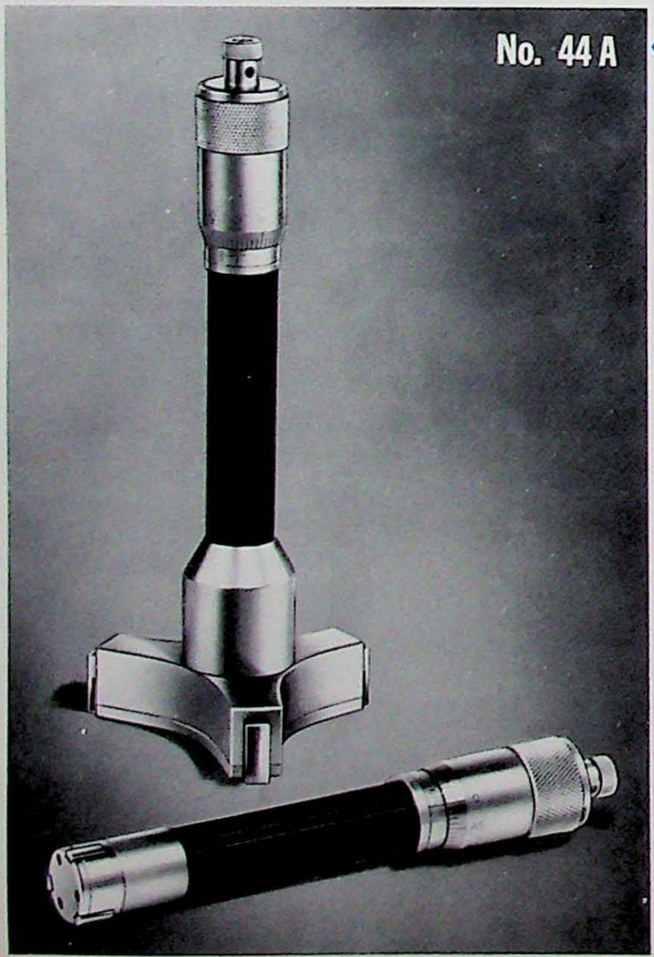
The complete set has a measuring range of 8″ to 40″ and consists of:

Micrometer Head, range 8″ to 9″, readings in .0005″. Extensions, to be combined for obtaining any desired length within the overall range; they are spherical measuring rods, spring loaded and protected from human temperature inside protective sleeves. In assembly, the tungsten carbide tipped spherical end faces make contact under unchanging constant pressure.

Extension No.	1	2	3	4	5
Length inches	1	2	4	8	16

For particularly large dimensions an extension of 32″ length is available.

This instrument serves well for measuring by dial readings of large bores. It can also be used for comparator measuring, with deviations from the nominal dimension observed on the dial. The always constant pressure achieves high accuracy even for measuring very large dimensions.



No. 44 A

Self Centering Inside Micrometer "INIMAR" for three-point measuring, reading in .0005″

Design: Sturdy dull chromed micrometer head made of all steel, with steel measuring head, also dull chromed, attached to gage body. The three contact points moving outward from the sides of the measuring head at 120° angles center the gage automatically inside the bore.

Range	.250″-.325″	.325″-.400″	.400″-.500″
regular bore depth	2″	2″	2½″
same with extension	4″	4″	5½″
Range	.500″-.650″	.650″-.800″	.800″-1″
regular bore depth	3″	3⁵⁄₁₆″	4″
same with extension	6″	6⅜″	8″
Range	1″-1.200″		1.200″-1.400″
regular bore depth	4″		4″
same with extension	8″		8″
Range	1.400″-1.600″	1.600″-2″	2″-2.400″
regular bore depth	4″	5½″	5½″
same with extension	8″	11½″	11½″
Range	2.400″-2.800″		2.800″-3.200″
regular bore depth	5½″		5½″
same with extension	11½″		11½″
Range	3.200″-3.600″		3.600″-4″
regular bore depth	5½″		5½″
same with extension	11½″		11½″

Inside Micrometer "INIMAR" in sets:

The larger sizes are also available in sets, including master setting rings and extensions in a wooden case.

Set No.	0	I	II	III
Range	.250″-.400″	.400″-.800″	.800″-1.600″	1.600″-4″
Number of micrometers	2	3	4	6
diameter of setting masters	.315″	.400″/.630″	1″/1⅜″	2″/3″/3½″
length of extensions	2″	3″	4″	6″

Mahr INDICATOR TESTING MACHINES

No. 865 Testing Machine

For Dial Indicators and Comparators.

This instrument serves for testing of dial indicators and comparators over their entire measuring range. In addition to checking the measuring accuracy, backlash can be reliably determined.

Construction:

The measuring anvil of the Testing Machine is raised and lowered by an accurate micrometer screw which is sliding back and forth without rotating and is operated by a handwheel acting through a pair of mitre gears. The spindle of the micrometer screw is hardened and accurately ground and has a built-in compensating curve for any pitch errors not yet eliminated. At the scale window graduations of .000050″ can be read. The underside of the barrel has accurately adjusted notches which provide rapid inspection of dial gages over their entire travel in the coarse range. This mechanism may be disengaged by the lever on the left of the machine. All moving parts are satin chrome finished.

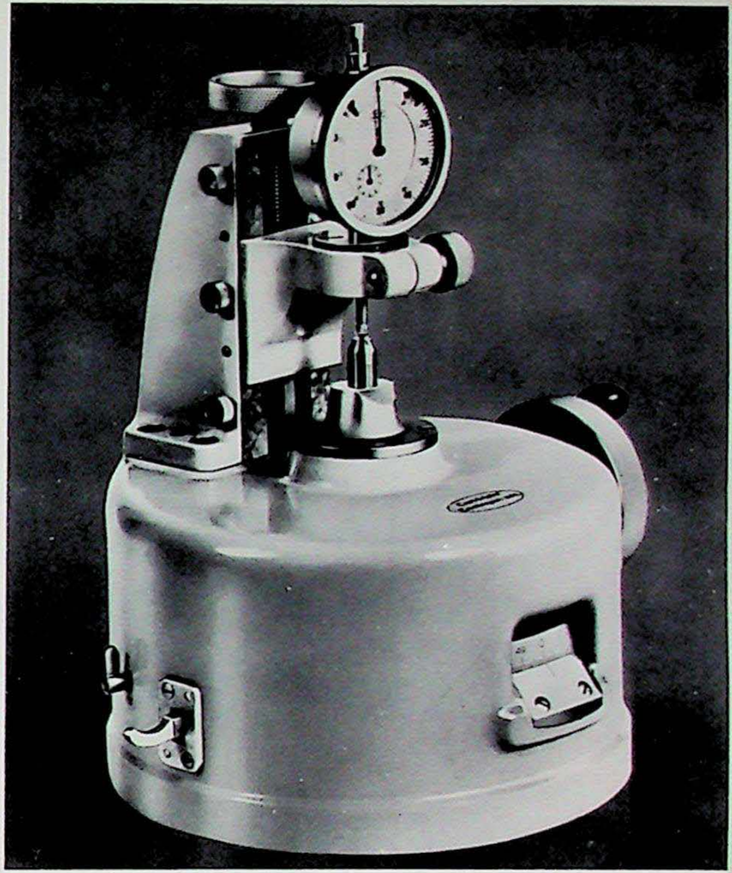
The bracket has a bore for mounting shanks of 1.1025″ diameter. Adapter bushings for indicator shanks of .315″ diameter are optionally available. Bushings for other mounting shanks can be supplied to order.

Specifications:

No. 865 Testing Machine

Directly reading in	.000050″
Measuring accuracy	±.000050″
Measuring range	.400″
Vertical range of bracket	2″

METRIC available.



No. 865

No. 865 S Testing Machine

For testing Comparators of highest accuracy.

Within an attractively shaped, extremely sturdy and rigid bed there is a double lever, completely shielded from penetration of dust and dirt. Its pivot rests in special ball bearings, free from play. Its long lever arm is engaged by a micrometer screw. The movements of the micrometer screw are transferred from the short lever arm of the double lever over a linkage rod moving in a reed suspension to the comparator to be tested. Thus the accuracy of the comparator can be checked from one division to the next.

The micrometer head reads in **5 millionths** and has a ratchet system for rapid testing of the comparators in steps of .0002″. This mechanism can be disengaged by a lever.

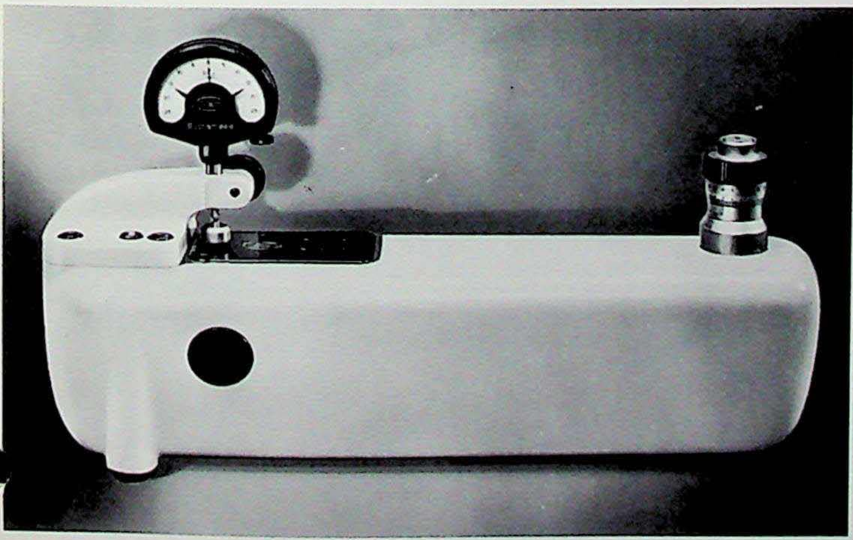
The bracket will accommodate comparators with a mounting shaft of .315″ diameter. An additional bracket and bushing is optionally available for the mounting of comparators with 1.1025″ and 1.181″ shaft diameter.

Specifications:

No. 865 S Testing Machine for Comparators.

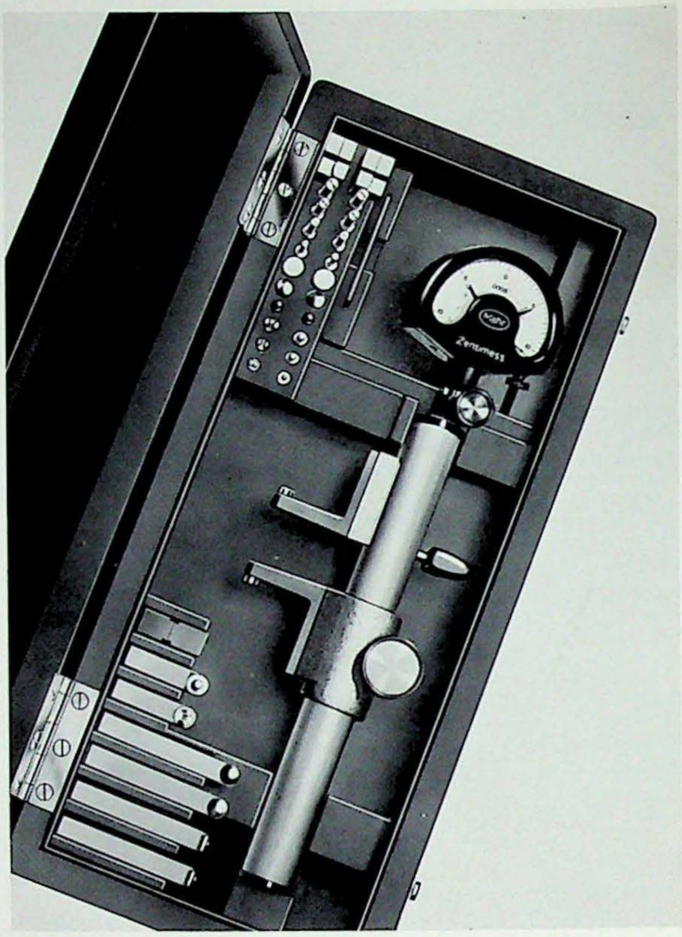
Directly reading in	5 millionths of an inch
Measuring range	.004″
Measuring accuracy	±.000005″

METRIC available.



No. 865 S

Mahr MULTI-PURPOSE PRECISION GAGE



No. 844 T Varimeter Multi Purpose Precision Gage

for measuring

INSIDE and OUTSIDE

Internal and External Threads	Internal and External Gears and Splines
Shallow Hubs and close to shoulders	Grooves, Keyways, Recesses, etc.

UNIQUE FEATURES

- Measuring direction reversible for inside or outside gaging
- Measuring arms interchangeable for various applications
- Measuring anvils interchangeable for various applications
- Precision Dial Comparators interchangeable for readings in .000020", .000050", .0001" or .0005"
- Measuring range up to 44"
- Extension of regular measuring range by reversing the measuring arms

Specifications:

Set No.	Range for internal measuring	Extended range for internal measuring	Range for external measuring	Extended range for external measuring
I	1" to 4.400"	1" to 8"	0" to 3.400"	0" to 7"
II	4" to 10.400"	4" to 14"	3" to 9.400"	3" to 13"
III	10" to 24.400"	10" to 28"	9" to 23.400"	9" to 27"
IV	24" to 40.400"	24" to 44"	23" to 39"	23" to 43"

including a black hardwood case which has spaces for interchangeable measuring arms and interchangeable anvils. Select dial comparators from page 14 to 15 or dial indicators from page 12 to 13. Select measuring arms and anvils from page 43.

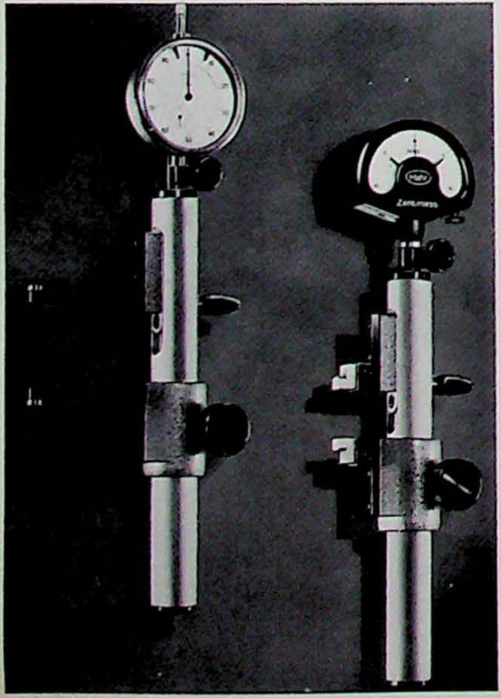


fig. 2 fig. 3

Construction:

The "Varimeter" can be applied to almost any measuring job within the depth of its measuring arms. Its basic construction uses a sturdy, precision ground and hard-chromed column carrying two brackets to which the interchangeable measuring arms are fastened. The lower arm is adjustable along the column; after setting the gage, it is locked in its position. The upper arm is moveable and can be retracted by a lever button within easy reach. Its movements register on the dial of the comparator. The measuring direction can be switched from inside to outside and vice versa by a simple adjustment. The moveable measuring arm runs in high precision ball bearings for utmost ease of movement and absolute stability.

The interchangeable measuring arms, selected for a particular gaging job from the listing of various types on page 43 are fastened by screws to the brackets. They are reversible for the purpose of extending the regular measuring range as shown in fig. 4. The tips of the arms are provided with accurate bores for inserting the interchangeable anvils, also selected for each particular gaging job from the specifications on page 43.

The gages are set to masters depending on the type of gaging to be performed, such as ring gages, gage blocks, thread setting rings, thread plug gages, or to specimens of the work of known accuracy.

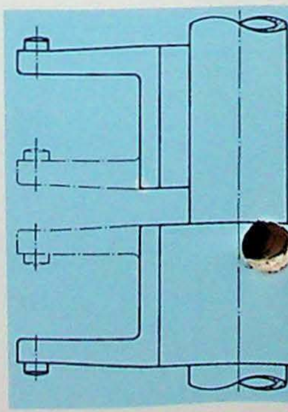
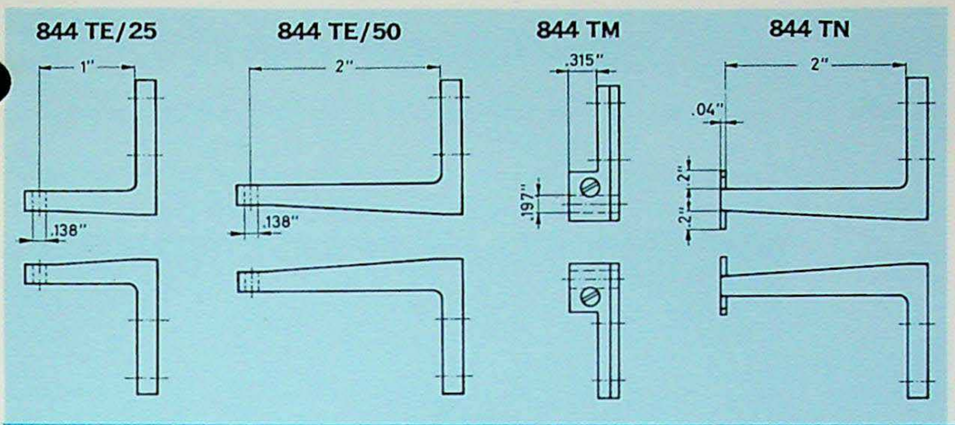


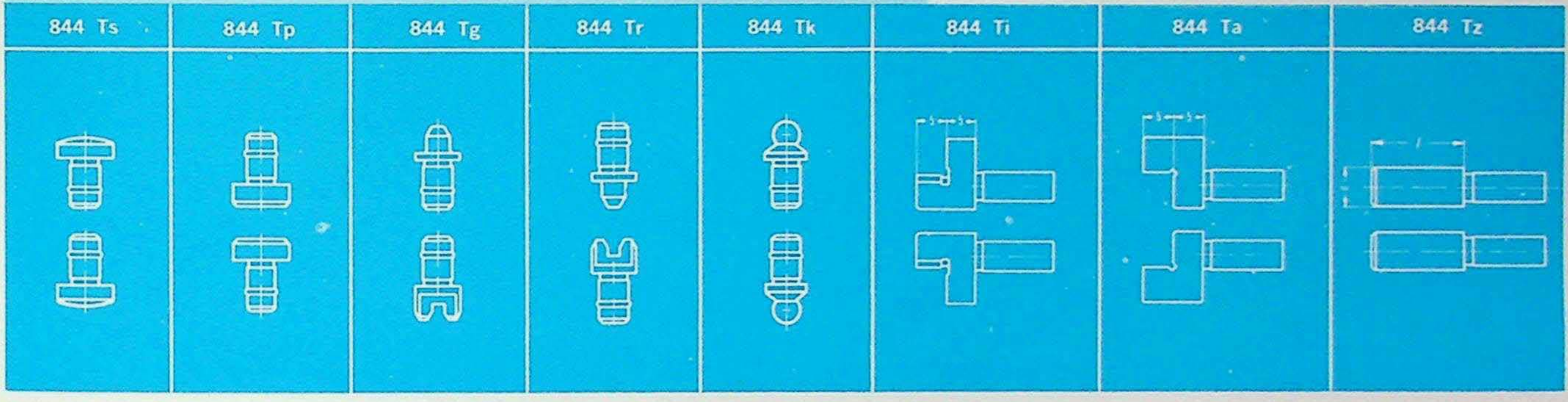
fig. 4

Mahr MULTI-PURPOSE PRECISION GAGE



Specifications:

No. 844 TE/25	Measuring Arms, 1" throat depth
No. 844 TE/50	Measuring Arms, 2" throat depth
No. 844 TM	Measuring Arms for attaching cylindrical pin anvils No. 844 Tz and similar special anvils with cylindrical and plane measuring faces.
No. 844 TN	Measuring Arms with narrow, thin measuring tips for measuring grooves and recesses on outside and inside diameter.



No. 844 Ts	Anvils with spherical tips for inside measuring (fit #844 TE arms)
No. 844 Tp	Anvils with plane tips for outside measuring of cylindrical work and measuring of distances and widths (fit #844 TE arms)
No. 844 Tg	Anvils for measuring internal threads (fit 844 TE arms)
No. 844 Tr	Anvils for measuring external threads (fit 844 TE arms)
No. 844 Tk	Ball anvils for measuring external and internal gears and splines (fit 844 TE arms)
No. 844 Ti	Half-round shoulder anvils for internal centering hubs and internal measuring close to shoulders or lips etc. (fit 844 TM arms)
No. 844 Ta	Plane face shoulder anvils for outside measuring of centering hubs and close to shoulders etc. (fit 844 TM arms)
No. 844 Tz	Cylindrical pin anvils for outside and inside splines, distance between holes and tooth thickness of internal splines (fit 844 TM arms)

INTERCHANGEABLE THREAD ANVILS

are available to fit measuring arms No. 844 TE/25 and No. 844 TE/50. These anvils are carefully hardened, aged and accurately ground. They consist for external threads of V-anvil and blade and for internal threads of V-anvil and cone anvil.

FOR PITCH DIAMETER

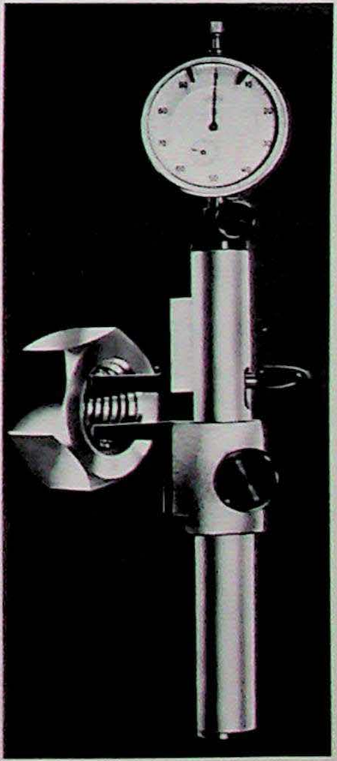
No. 844 Tg fm for metric internal threads (60°) No. 844 Tr fm for metric external threads (60°)

	No. I	**II**	**III**	**IV**	**V**	**VI**
Pitch mm	0.5–0.7	0.75–1	1.25–1.75	2–3	3.5–4.5	5–6

No. 844 Tg fw for Whitworth internal threads (55°) No. 844 Tg f UST for American internal threads (60°)
No. 844 Tr fw for Whitworth external threads (55°) No. 844 Tr f UST for American external threads (60°)

No. 1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
60-48	48-40	40-32	32-24	24-18	18-14	14-10	10-7	7-4.5	4.5-3

threads per inch



FOR THE OUTSIDE OR MAJOR DIAMETER OF INTERNAL THREADS AND THE ROOT-DIAMETER OF EXTERNAL THREADS

Here every pitch requires a separate V-anvil. The Cone- or Blade-anvils (always by pairs), however, may be used for several pitches.

No. 844 Tg am for metric internal threads (60°) No. 844 Tr km for metric external threads (60°)

V-anvil for	**0.5 0.6 0.7 0.75 0.8 0.9 1**	**1.25 1.5 1.75**	**2 2.5 3**	**3.5 4 4.5**	**5 5.5 6**	**mm pitch**
Cone- or blade anvil for	0.5-1	1.25-1.75	2-3	3.5-4.5	5-6	mm pitch

No. 844 Tg aw for Whitworth internal threads (55°) No. 844 Tg a UST for American internal thread (60°)
No. 844 Tr kw for Whitworth external threads (55°) No. 844 Tr k UST for American external thread (60°)

V-anvil for	**28 20 19**	**18 16 14**	**12 11 10**	**threads per inch**
Blade anvil for	28-18	18-14	14-10	threads per inch
V-anvil for	**9 8 7**	**6 5 4.5**	**4 3.5 3.25 3**	**threads per inch**
Blade anvil for	10-7	7-4.5	4.5-3	threads per inch

Special Measuring Anvils can be made to order.

Please submit drawing of work to be checked or furnish sample.

Mahr UNIVERSAL MEASURING MACHINE

No. 828 Universal Measuring Machine

For OUTSIDE and for INSIDE measurements, as well as for gaging of EXTERNAL and INTERNAL THREAD.

Construction:

An extremely precise-made, oversize guide cylinder carries a fixed measuring head with built-in feeler point which is suspended free from play and friction. This feeler point transfers the measuring motion in a straight line to the comparator which is mounted in the measuring head. This principle assures utmost measuring accuracy. The comparator is interchangeable. In place of a mechanical comparator, other types of indicating instruments, as for instance electric comparators with built-in limit contacts for mass production gaging, or electronic cartidges for extremely high measuring discrimination, can be inserted. The mounting bore is .375″ (AGD).

The adjustable measuring head can be moved by handwheel. It carries a large size ultra-precision Micrometer head for parallax-free reading of .0001″. The tungsten carbide tipped measuring faces are lapped accurately plane and parallel. This permits measuring of cylindrical as well as flat work with sides parallel to each other.

The measuring pressure is adjustable by means of a scale to 8, 16, 40, 48 oz. and to 2 and 4 oz. if the electronic comparator "Millitron" is used. The pressure adjusting knob also serves as a switch for outside and inside measurement.

Operation:

The Universal Measuring Machine is a comparison instrument. It is set to gage blocks. The range of the micrometer head is .500″. Thus only a few gage blocks in steps of .500″ are needed for setting the measuring machine. Setting and measuring procedure are simple and fast. Coarse adjustment is done by moving the adjustable measuring head. Fine adjustment to be made on the micrometer head and comparator.

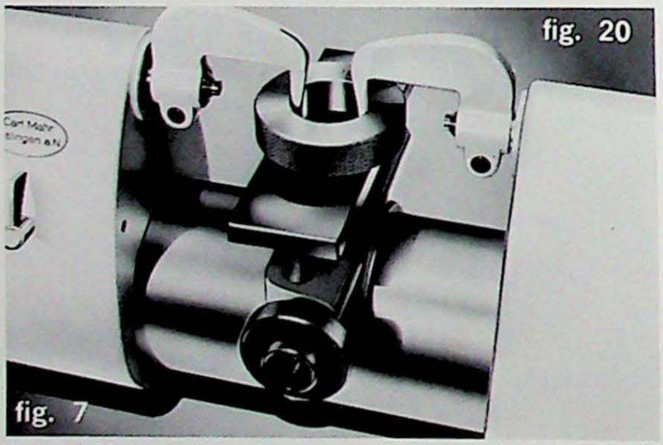


fig. 20

fig. 7

Internal Measurements

With the aid of measuring jaws as per fig. 20, the Universal Measuring Machine is an excellent instrument for precision gaging of bores, especially ring gages and setting rings.

In addition to bores, plane and parallel internal surfaces can be measured. For internal measuring, the direction of measuring pressure is reversed.

Measuring of Bores (No. 828 i Measuring Jaws)

For measuring of bores, a pair of jaws No. 828 i with ball tips are mounted over the anvils. Setting of the machine can be accomplished with ring gages or gage block set-up. Measuring range when used with jaws No. 828 i .... .400″ to 8¾″.

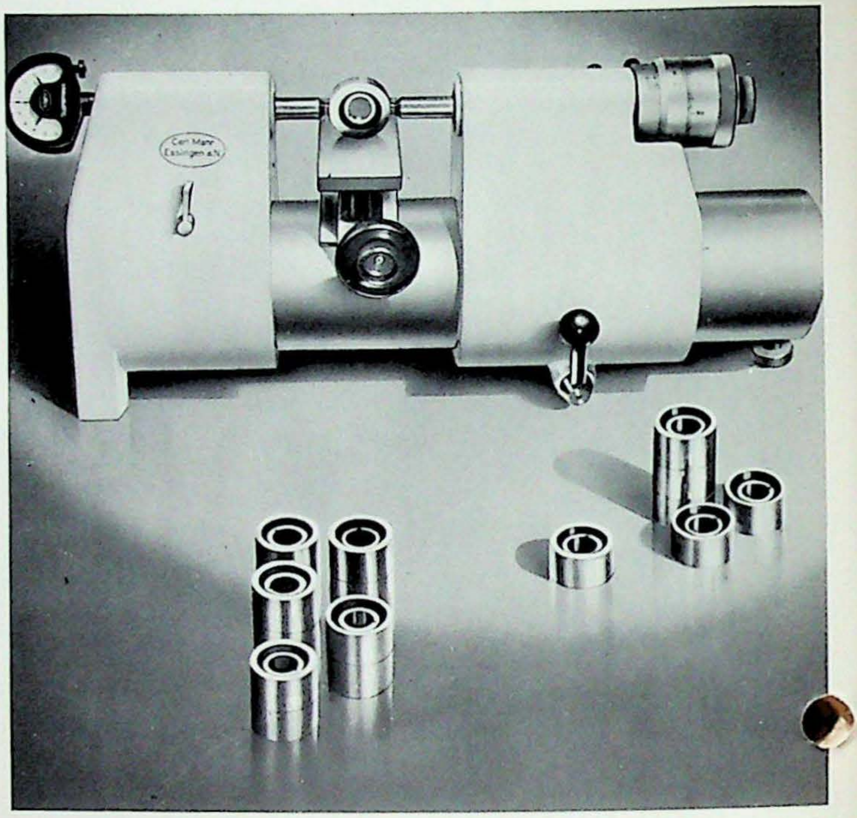
Measuring the Distance between Plane and Parallel Internal Surfaces (No. 828 p Measuring Jaws)

For measuring of the distance between plane and parallel internal surfaces a single jaw No. 828 p is used in combination with the internal jaws No. 828 i. These jaws have, for alignment of the internal surface, to be measured at right angle to the measuring axis, two ball faces (distance ¼″). Measuring range when used with the internal jaws No. 828 i and 828 p from .400″ to 8¾″.

Support Table

An adjustable table 2″ x 6″, with a vertical movement of 1½″ for supporting the work, is standard accessory.

SUPER ACCURATE	in Performance
SIMPLICITY	in Operation
RUGGEDNESS	in Design



Specifications:

No. 828 Universal Measuring Machine

Graduation on Micrometer head	.0001″
Range of Micrometer head	0–.500″
Graduation on "Supramess" Comparator	.000020″
Total measuring range	0-12″
Measuring Pressure instantly adjustable from	2 to 48 oz.

The following accessories are available:

No. 828 i Inside Measuring Jaws
Fig. 20, measuring range .400″-8¾″.

No. 828 p Inside Measuring Jaws
For measuring between plane and parallel internal surfaces. Measuring range .400″-8¾″.

No. 828 E Collar Adapters
For external thread measuring (fig. 22), to hold interchangeable measuring anvils. The measuring range when using these adapters is 0″-10″.

No. 828 G Inside Measuring Jaws
For internal thread measuring (fig. 23), to hold interchangeable thread measuring anvils. The measuring range with these jaws is 1″-9½″.

No. 828 e Thread Measuring Anvils
For measuring external thread, 60° thread angle, one pair for each pitch required.

No. 828 g Thread Measuring Anvils
For measuring female thread, 60° thread angle, one pair for each pitch required.

METRIC version available.

Mahr UNIVERSAL MEASURING MACHINE

The No. 828 Universal Measuring Machine

described on page 44, can be adapted with suitable accessories for the gaging of External and Internal Threads:

Measuring of external thread with thread measuring wires:

Holders with measuring wires #41 for the three wire thread measuring method may be attached to the anvils of the measuring machine (fig. 24). Refer to page 62.

Measuring of external thread with thread measuring anvils #828 E Collar Adapters:

For measuring external threads with interchangeable thread measuring anvils, collar adapters #828 E are available (fig. 22). They have bores for inserting interchangeable thread measuring anvils with shortened sides #828 e. For every pitch a separate pair of anvils is necessary.

Measuring range with use of collar adapters 0-10".

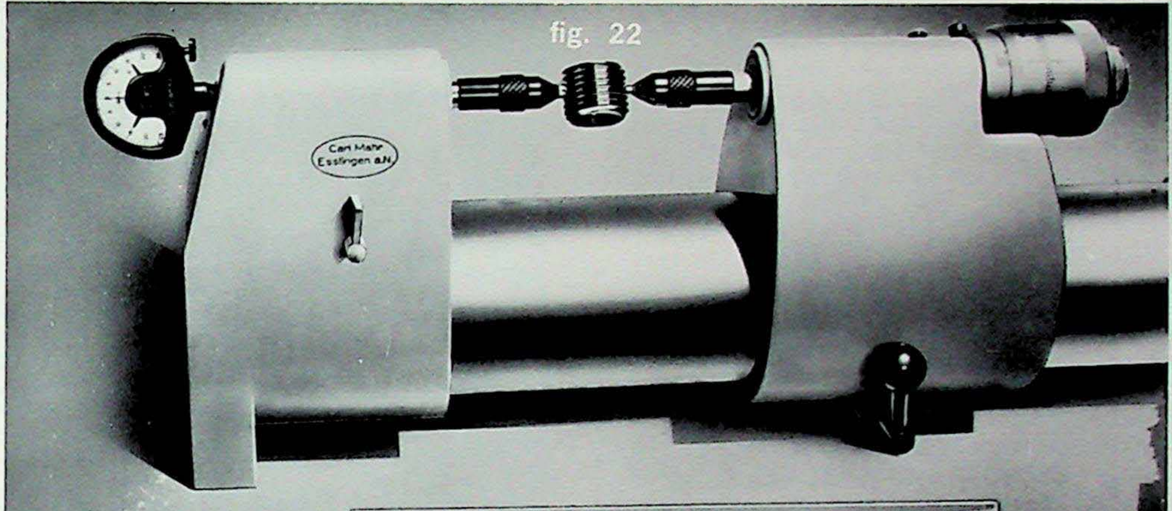


fig. 22

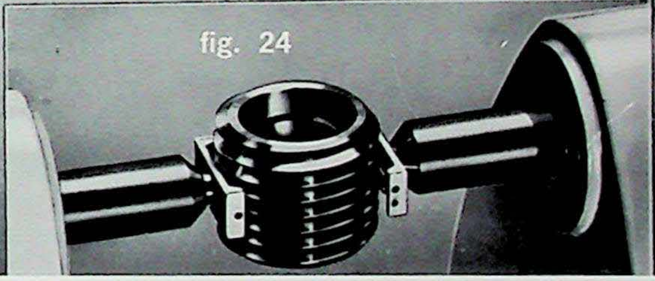


fig. 24

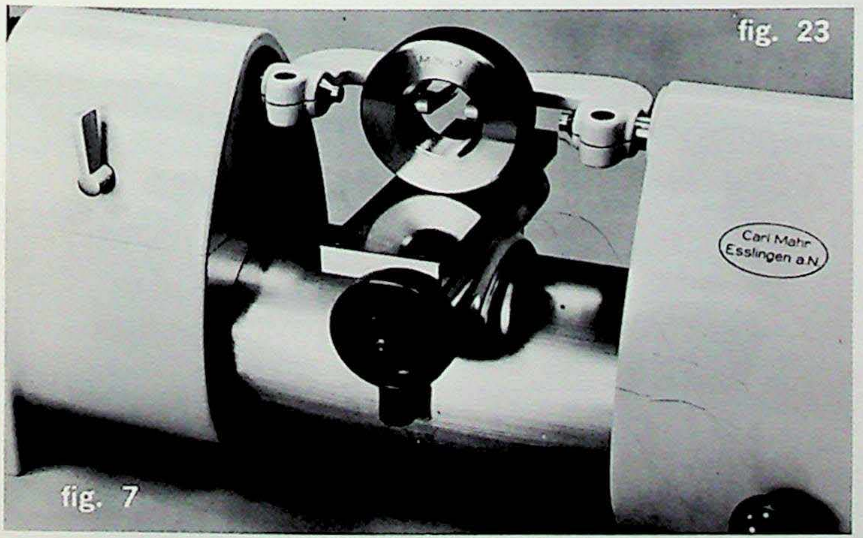


fig. 23

fig. 7

Measuring of internal thread with thread measuring anvils No. 828 G Measuring Jaws.

For measuring of female threads a pair of measuring jaws can be furnished as illustrated (fig. 23). They have bores for inserting interchangeable thread measuring anvils No. 828 g. For information on measuring anvils, refer to page 44 (bottom). For every pitch a separate pair of anvils is necessary.

Measuring range when measuring jaws No. 828 G are used .... 1"-9½".

Outstanding features of No. 828 Mahr Measuring Machine

Observe convenient lever (fig. 7) for rapid retraction of moveable anvil. The anvil is under predetermined measuring pressure, aiding the measuring procedure by eliminating "feel" of operator. There is no backlash in the transfer movement to the gaging head. The absence of force minimizes wear of measuring faces and speeds up inspection a great deal.

Accessories are available to convert the instrument for gaging of OUTSIDE and INSIDE THREADS and for PARALLEL SURFACES such as in Snap Gages.

The measuring pressure is adjustable by means of a scale to 8, 16, 40, 48 oz. and to 2 and 4 oz. if the electronic comparator "Millitron" is used. The pressure adjusting knob also serves as a switch for outside and inside measurement.

The large Micrometer Head with non-rotating spindle guarantees an accuracy of .0001" over its full measuring range under constant use. It can be locked. The vernier can be rotated by 90° to place it in easy viewing position of the operator.

Direct reading can be taken from the "Supramess" Comparator in

20 MILLIONTHS of an inch.

This Comparator is interchangable with No. 1003 Z "Millimess" Comparator, reading in 50 millionths or No. 500 Z "Compramess" Comparator, reading in .0001", electric Comparators with built in contacts (see pages 16-19) for mass production gaging, or Electronic Cartridges for extrẽmely high measuring discrimination.

Mahr MULTI-PURPOSE MICROMETER

No. 40Z Multi-Purpose Micrometer

With **interchangeable** measuring anvils. Sturdy satin chrome finished construction. Spindle hardened throughout, measuring screw most accurately ground, reading in .0001″ with clamp ring and ratchet stop.

Since the measuring anvils are interchangeable, the MAHR Multi-Purpose Micrometer provides a

Screw Thread Micrometer
Blade Type Micrometer
Ball Anvil Type Micrometer
Conventional Micrometer
Special Application Micrometer
} all in one instrument

Anvil and spindle of the MAHR Multi-Purpose Micrometer are provided with very accurate bores into which the interchangeable anvils are inserted. They are held securely by means of snap ring, but may still be rotated. The rear plane faces of the anvils rest against hardened steel spheres which have been pressed into the bores of anvil and spindle.

Zero setting is accomplished quickly and accurately by an ingenious adjustment on the anvil side. The anvil can be adjusted approximately .060″ and then secured by locknut. For the setting of micrometers larger than 1″, our thread standards #43Z may be used.

Specifications:

No. 40Z Multi-Purpose Micrometer, reading in .0001″
Range: 0″—1″ 1″—2″ 2″—3″ 3″—4″ 4″—5″ 5″—6″
6″—7″ 7″—8″

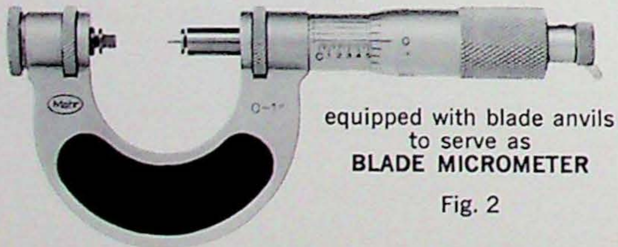
Without interchangeable anvils. Select anvils from specifications on bottom of page.

For sizes 0—12″, the Indicating Micrometers No. 40T (see page 4) can be furnished with bores in spindle and anvil for inserting interchangeable measuring anvils (use catalog No. 40TZ).

For larger sizes we can furnish
No. 40WZ Micrometer or
No. 40UZ Micrometer with Dial Indicator
as described on page 52, but provided with standard bores on spindle and anvil for inserting interchangeable measuring anvils.

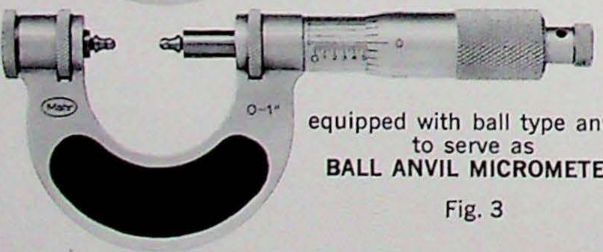
Measuring range: 8″—12″ 12″—16″ 16″—20″
20″—24″ 24″—28″

Metric available



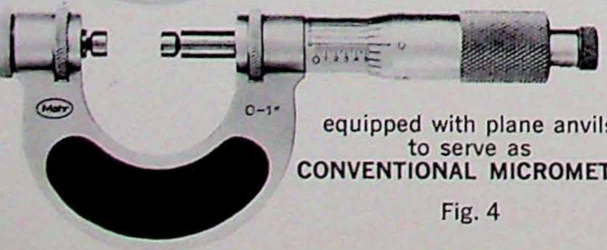
equipped with blade anvils to serve as **BLADE MICROMETER**

Fig. 2



equipped with ball type anvils to serve as **BALL ANVIL MICROMETER**

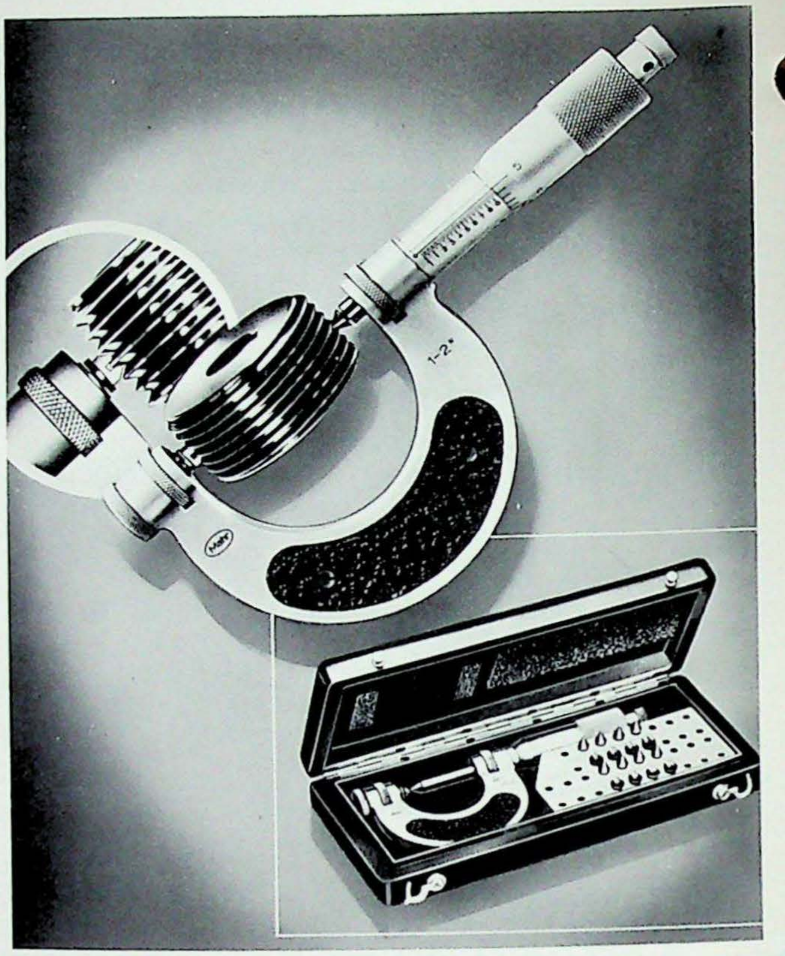
Fig. 3



equipped with plane anvils to serve as **CONVENTIONAL MICROMETER**

Fig. 4

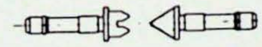
All anvils are interchangeable in ALL sizes, namely from 0″—28″ range.



INTERCHANGEABLE ANVILS FOR MULTI-PURPOSE MICROMETER No. 40Z

These anvils are carefully hardened, aged and accurately ground to an accuracy that permits 180° rotation.
The form of the anvils is tested by optical methods.

For measuring pitch diameters:
No. 40Z fm. for metric threads (60°)



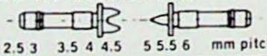
No.	I	II	III	IV	V	VI
Pitch . . . . mm	0.5-0.7	0.75-1	1.25-1.75	2-3	3.5-4.5	5-6

No. 40Z fw. For Whitworth threads (55°)
No. 40Z fUST. For American threads (60°)

No.	1	2	3	4	5	6	7	8	9	10
Threads per inch	50-48	48-40	40-32	32-24	24-18	18-14	14-10	10-7	7-4.5	4.5-3

For measuring root diameters:
Here every pitch requires a separate V-anvil. The pointed anvils (always by pairs) however may be used for several pitches.

No. 40Z km. For metric threads

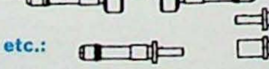


V-anvil for	0.5 0.6 0.7 0.75 0.8 0.9 1	1.25 1.5 1.75	2 2.5 3	3.5 4 4.5	5 5.5 6	mm pitch
Pointed anvil for	0.5-1	1.25-1.75	2-3	3.5-4.5	5-6	mm pitch

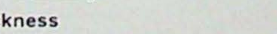
No. 40Z kw. For Whitworth threads
No. 40Z kUST. For American threads

V-anvil for	28 20 19	18 16 14	12 11 10	9 8 7	6 5 4.5	4 3.5 3.25 3	thds per inch
Pointed anvil for	28-18	18-14	14-10	10-7	7-4.5	4.5-3	thds per inch

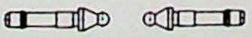
For measuring outside diameter:
No. 40Z a. Anvils with plane faces



For checking Recesses, Grooves, Splines etc.:
No. 40Z b—
1 Pin Anvil & 1 Blade Anvil . . . .030″ Blade Thickness



For checking Pin Measurements for Gears:
No. 40Z g—
2 Ball Tips, state pitch to be checked, also available with 1 Ball Tip and 1 Roller Tip



For Special Applications:
Special Anvils made to order. PLEASE FURNISH BLUE PRINTS.

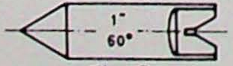


Fig. 6

No. 43Z Standards for setting of Multi-Purpose-Micrometers, when using thread anvils.

They are hardened, seasoned and most accurately ground. Please indicate thread angle when ordering.

Size	1	2	3	4	5	6		inches
Size	7	9	11	13	15	17	19	inches

Mahr INSIDE THREAD GAGES

No. 44FZ Inside Micrometer

For thread measurements, with interchangeable anvils. Satin chrome finished, spindle hardened throughout, measuring screw most accurately ground, readings in .001".

The construction is identical with our No. 44F described on page 53 except that these micrometers are provided at both ends with very accurate bores into which interchangeable anvils are inserted. Thus they provide for measuring of inside screw threads for pitch, major and minor diameters from 3" upward. The anvils are held securely by means of snap ring. but may still be rotated. The rear plane faces of the anvils rest against hardened steel spheres. Setting is done with thread ring gages or No. 40Z Multi-Purpose Micrometers. One of the measuring heads provides a clamping nut for readjustment.

Specifications:

No. 44FZ. measuring range 3-4" and so on, increasing by 1" up to 20".

Prices are without case.

For measuring the thread pitch diameter **Interchangeable Anvils** in sizes as follows are available:

No. 44FZfm For metric thread (60°)

No.	III	IV	V	VI
for	1.25-1.75	2-3	3.5-4.5	5-6 mm pitch

No. 44FZfw For Whitworth threads (55°)

No. 44FZfust For American Threads (60°)

No.	5	6	7	8	9	10
for	24-18	18-14	14-10	10-7	7-4.5	4.5-3 threads per inch

For measuring the major diameter of the female thread every pitch requires a special V-anvil. The pointed anvil may be used for several pitches within the above mentioned ranges.

For measuring the minor diameter a pair of anvils with half round faces are used.

No. 44Z Precision Inside Thread Micrometer

with interchangeable anvils. Micrometer satin chrome finished, with hardened and ground lead screw of 1/40" pitch, graduation .001".

These micrometers are designed primarily for measuring pitch diameter in female threads. Since the anvils are interchangeable, it is likewise possible to check outside and root diameters with appropriately shaped anvils.

The two measuring jaws have bores of 3.5mm diameter into which the anvils are inserted. The anvils have a snap ring on their shaft, which holds them securely, but capable of being rotated, inside the bore. The micrometers are set to thread ring gages or to micrometers No. 40Z (page No. 46). For that purpose the left measuring jaw has a fine adjustment screw.

Specifications:

No. 44Z
Measuring range **1"-2" 2"-3"**
including wooden case

For measuring of pitch diameter interchangeable thread measuring anvils for the micrometers are supplied in steps as listed below:

No. 44Zfm For metric thread (60°)

No.	III	IV	V	VI
for	1.25-1.75	2-3	3.5-4.5	5-6 mm pitch

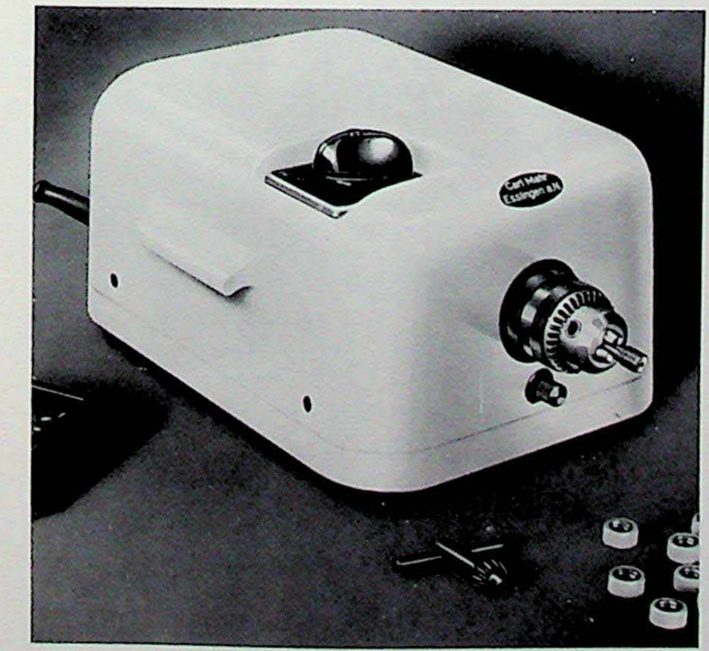
No. 44Zfw For Whitworth Thread (55°)

No. 44Zfust For American Thread (60°)

No.	5	6	7	8	9	10
for	24-18	18-14	14-10	10-7	7-4.5	4.5-3 threads per inch

For measuring the outside diameter of the female thread a separate V-anvil is necessary for each pitch. The pointed anvil can be used for several pitches, as listed in the range specifications above.

For measuring of the inside or minor diameter, a pair of anvils with spherical measuring faces is used.



No. 750 High Speed Screw Thread Inspection Instrument

For Internal Threads up to ¾" Diameter.

For checking internal threads in mass-produced small parts, the above instrument is a time- and cost saving device. It can also be used as a small tapping machine.

Operation: Pressing the work with its bore against the thread plug gage, which is held in the chuck, will actuate a friction disc, rotating the plug gage. A second friction disc is set into motion when trying to pull the work piece away from the spindle, affecting a reverse movement of the plug gage.

Technical Data: Furnished with built-in electric motor of .1 hp, operating on 110 Volts A.C. (Optionally available for 220 Volts A.C.). A control switch will alter forward movement from 200 rpm to 400 rpm. In reverse motion, the speeds are about 30% higher. The chuck has a clamping range from 0 - .400".

Overall length	13¾"
width	8¾"
height	6⅜"
weight	31 lbs.

Mahr INDICATING THREAD SNAP GAGE

No. 852 Indicating Snap Gage

With interchangeable anvils. With super sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenth, or ½ thousandth of an inch.

The construction is identical with our No. 840F Snap Gages (refer to page 7). These gages have a lever on back of frame for rapid retraction of moveable anvil.

Anvil and spindle are provided with very accurate bores into which the interchangeable anvils are inserted. They are held securely by a snap ring but may still be rotated. The rear plane faces of the anvils rest against hardened steel spheres which have been pressed into the bores of anvil and spindle. Setting is accomplished with master thread gages or gage blocks respectively.

Specifications:

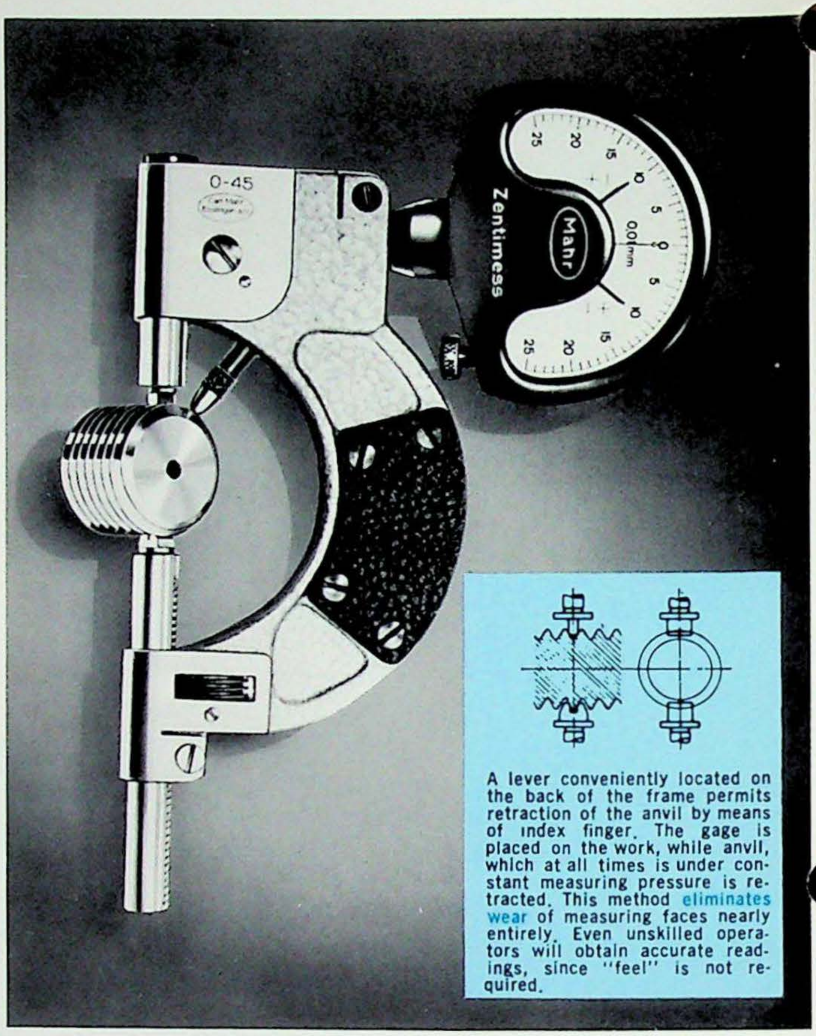
range: 0″-1¾″ 1¾″-3⅜″ 3⅜″-5½″ 5½″-7½″

All sizes are furnished in finished hardwood case which provides space for anvils, but without comparator gaging heads and without anvils.

Select Precision Comparator from pages 14-15.

Select interchangeable anvils from specifications on bottom of this page.

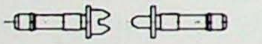
If desired for METRIC, select comparator graduated in millimeters and select metric thread anvils.



A lever conveniently located on the back of the frame permits retraction of the anvil by means of index finger. The gage is placed on the work, while anvil, which at all times is under constant measuring pressure is retracted. This method eliminates wear of measuring faces nearly entirely. Even unskilled operators will obtain accurate readings, since "feel" is not required.

These anvils are carefully hardened, aged and accurately ground to an accuracy that permits 180° rotation.
The form of the anvils is tested by optical methods.

For measuring pitch diameters:
No. 852 fm. **for metric threads (60°)**



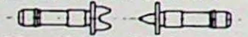
No.	I	II	III	IV	V	VI
Pitch . . . mm	0.5-0.7	0.75-1	1.25-1.75	2-3	3.5-4.5	5-6

No. 852 fw. **For Whitworth threads (55°)**
No. 852 fUST. **For American threads (60°)**

No.	1	2	3	4	5	6	7	8	9	10
Threads per inch	50-48	48-40	40-32	32-24	24-18	18-14	14-10	10-7	7-4.5	4.5-3

For measuring root diameters:
Here every pitch requires a separate V-anvil. The pointed anvils (always by pairs) however may be used for several pitches.

No. 852 km. **For metric threads**

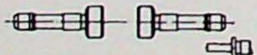


V-anvil for	0.5 0.6 0.7 0.75 0.8 0.9 1	1.25 1.5 1.75	2 2.5 3	3.5 4 4.5	5 5.5 6	mm pitch
Pointed anvil for	0.5-1	1.25-1.75	2-3	3.5-4.5	5-6	mm pitch

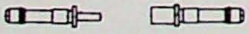
No. 852 kw. **For Whitworth threads**
No. 852 kUST. **For American threads**

V-anvil for	28 20 19	18 16 14	12 11 10	9 8 7	6 5 4.5	4 3.5 3.25 3	thds per inch
Pointed anvil for	28-18	18-14	14-10	10-7	7-4.5	4.5-3	thds per inch

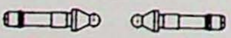
For measuring outside diameter:
No. 852 a. **Anvils with plane faces**



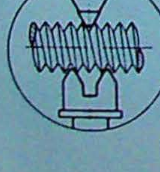
For checking Recesses, Grooves, Splines etc.:
No. 852b—
1 Pin Anvil & 1 Blade Anvil .....030″ Blade Thickness



For checking Pin Measurements for Gears:
No. 852g—
2 Ball Tips, state pitch to be checked, also available with 1 Ball Tip and 1 Roller Tip



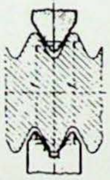
For Special Applications:
Special Anvils made to order. PLEASE FURNISH BLUE PRINTS.



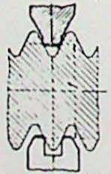
For measuring the pitch diameter of fine pitches of 0.2, 0.25, 0.3, 0.35, 0.4, 0.45 and 0.5 mm special anvils are supplied. These anvils bridge across three threads (see sketch). Setting is done by a thread plug gauge. A separate pair of anvils is required for every pitch.

Anvils with Shortened Sides

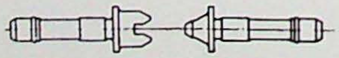
For Screw Thread Snap Gage No. 852



If the angle of a screw thread is more acute or obtuse than its nominal value, the measuring results are affected, as can be seen from the sketch to the right, because the anvils do not fit properly in the thread profile.



This source of error is almost entirely eliminated by the use of anvils with shortened sides. These are supplied for metric threads from 1.5 mm pitch and for Whitworth and U S threads from 16 t. p. i. With these anvils the points of the Vees are removed, the V bottom is relieved and the point anvil is shortened and offset. In this way the anvils rest against approximately ⅓ of the flank width and may therefore be used to make measurements practically unaffected by angle errors. Measurements with these stub anvils give the most accurate results; however, a separate pair of anvils is required for every pitch.



No. 852 vfm. **For metric threads (60°)**
Pitch ..... mm 1.5 1.75 2 2.5 3 3.5 4 4.5 5 5.5 6

No. 852 vfw. **For Whitworth threads (55°)**

No. 852 vfUST. **For American threads (60°)**
Threads per inch 16 14 12 11 10 9 8 7 6 5 4½

Mahr INDICATING THREAD SNAP GAGE

No. 853 Indicating Screw Thread Snap Gage

with **interchangeable** anvils, for 3 or 5 flute taps

With super sensitive comparator gaging heads, reading in 50 millionths, tenths or ½ thousandth of an inch. This design permits that the three measuring anvils enter the screw thread. Two of these thread anvils are mounted on a bridge cross head held by the spindle. The third thread anvil is inserted in the bore of the anvil of the snap gage which is under predetermined measuring pressure. A variation from the screw thread standard can be read from the comparator in .0005", .0001" or .000050" accurately and quickly. Separate gages are required for the measuring of 3 and 5 flute taps. For 5 flute taps (see insert) the two anvils of the lower bridge cross head should have a correspondingly more acute angle and the transmission of the upper measuring anvil movement is modified to suit this angle so that the pitch diameter can be read. Specify clearly if gages are to be used with 3 or 5 flute taps.

Specifications:

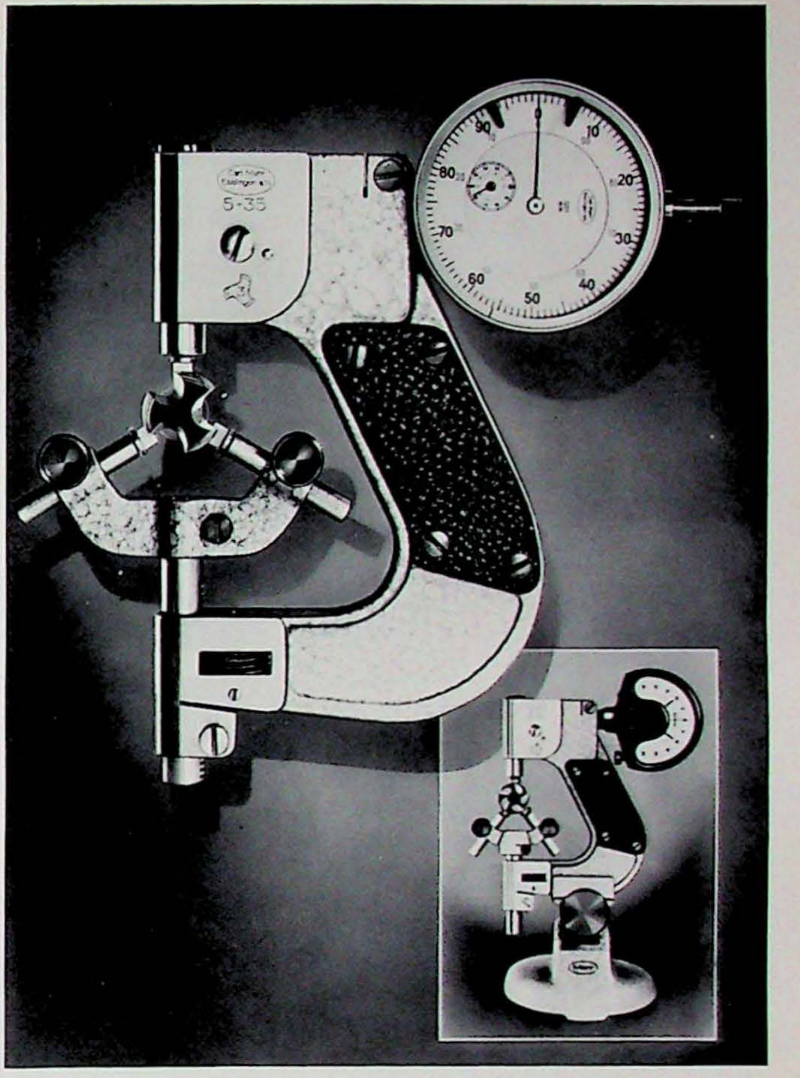
range: **3/16"-1⅜" 1⅜"-3"**

All sizes are furnished in finished hardwood case, which provides space for anvils, but without comparator gaging heads and without anvils.

Select Precision Comparator from page 14-15. Select interchangeable anvils from specifications on bottom of this page.

If desired for METRIC, select comparator graduated in millimeters and select metric thread anvils.

Tool Stand No. 41H is optionally available.



INTERCHANGEABLE ANVILS

for Screw Thread Snap Gauges No. 853

1 set 3 pieces for 3 or 5 flute taps

These anvils are carefully hardened, aged and accurately ground to an accuracy that permits 180° rotation.

The form of the anvils is tested by optical methods.

For measuring the pitch diameter:

No. 853 fm. For metric threads (60°)*

	No.	I	II	III	IV	V	VI
Pitch . . .	mm	0.5-0.7	0.75-1	1.25-1.75	2-3	3.5-4.5	5-6

No. 853 fw. For Whitworth threads (55°)

No. 853 fUST. For American threads (60°)

No.	1	2	3	4	5	6	7	8	9	10
Threads per inch	60-48	48-40	40-32	32-24	24-18	18-14	14-10	10-7	7-4.5	4.5-3

For measuring the minor diameter:

Here every pitch requires a separate V-anvil. The pointed anvils (always by pairs) however may be used for several pitches.

No. 853 km. For metric threads

V-anvil for	0.5 0.6 0.7 0.75 0.8 0.9 1	1.25 1.5 1.75	2 2.5 3	3.5 4 4.5	5 5.5 6	mm pitch
Pointed anvil for	0.5-1	1.25-1.75	2-3	3.5-4.5	5-6	mm pitch

No. 853 kw. For Whitworth threads

No. 853 kUST. For American threads

V-anvil for	28 20 19	18 16 14	12 11 10	9 8 7	6 5 4.5	4 3.5 3.25 3	thds per inch
Pointed anvil for	28-18	18-14	14-10	10-7	7-4.5	4.5-3	thds per inch

For measuring outside diameter:

No. 853 a. Anvils with plane faces

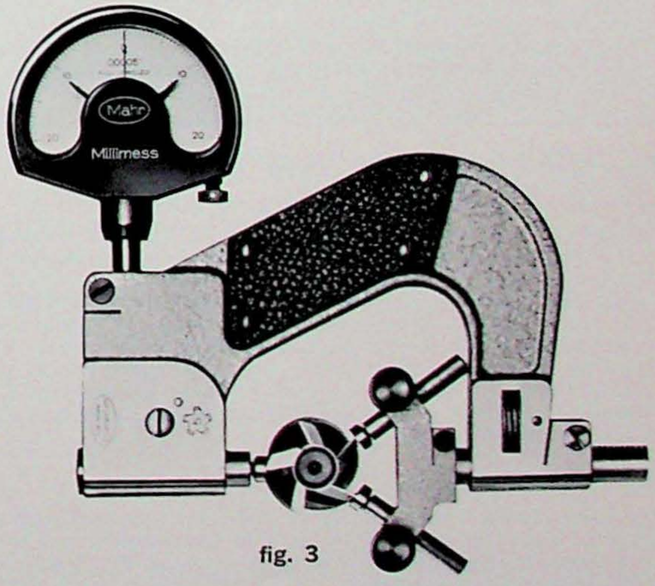


fig. 3

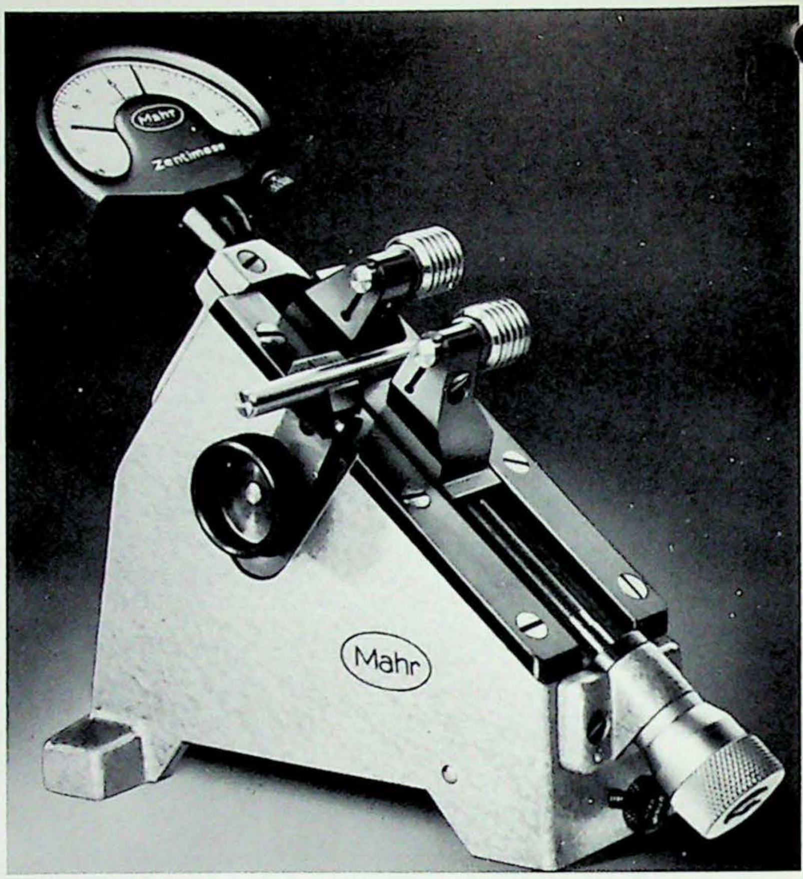
This illustration shows the No. 853 indicating Screw Thread Snap Gage with interchangeable anvils with plane faces for measuring the diameter of the fluted cutting tools, namely taps, reamers, end mills, cutters. Out-of-Roundness of cylindrical work can be accurately checked.

TUNGSTEN CARBIDE tipped PLANE FACE anvils are available to special order.

*For measuring the pitch diameter of fine pitches of 0.2, 0.25, 0.3, 0.35, 0.4, 0.45 and 0.5 mm special anvils are supplied with V-anvils made to bridge across three threads (see sketch page 48). Setting is done by a thread plug gage. A separate set of anvils is required for every pitch.

Mahr ROLLER THREAD COMPARATOR

No. 706 V Indicating Roller Thread Comparator



For the rapid inspection of external threads, with super sensitive comparator gaging heads reading directly in .000050", .0001" or .0005".

The Indicating Roller Thread Comparator is an ADJUSTABLE Roller Thread Snap Gage with interchangeable Measuring Rollers, covering a range for diameters from .120" to 2.000". It indicates not only whether the inspected thread is "good" or "reject" but it clearly states the tolerance position of the work. This alerts the operator to the wear of tools enabling him to take corrective action before rejects are produced. Sorting into classes of accuracy is a simple procedure. Out-of-round can be detected by turning the work between rollers.

The sloping front of the instrument holds two roll holders. The upper (spring-loaded) holder transmits its movement free of play to the measuring spindle of the comparator. The lower holder is adjustable by micrometer screw. It may be locked by a toggle on the right hand side of the housing. The measuring rollers revolve easily with a little lengthwise play on the rigid cantilever supported axles. An adjustable stop assures the contact of the measuring rollers with the diametrical section of the work. The measuring pressure may be increased or decreased by means of a knurled screw underneath the micrometer barrel, depending on whether coarse or fine threads are to be measured.

Setting is accomplished with Thread Plug Gage.

Specifications: **No. 706 V** Indicating Roller Thread Comparator, range .120" to 2.000" to be used with interchangeable measuring rollers.

Furnished **without** Comparator Gaging Head and **without** Measuring Rollers.
Select Precision Comparator from pages 14 and 15.
Select Measuring Rollers from following specifications.
METRIC available.

No. 706 Vr Thread Measuring Rollers

A special pair of rollers is required for each type of thread and each pitch. Threads of identical pitch may be measured with the same roller pair regardless of their diameter. Right hand and left hand threads may also be tested with identical rollers. These rollers have a practically unlimited life as they are subject to very little wear.

Measuring rollers for conical threads can be made to order.

Smooth cylindrical rollers No. 706 Vrg can be supplied for checking cylindrical parts.

Specifications: **No. 706 Vr** Thread Measuring Rollers.

Standard sizes: 14, 16, 18, 20, 24, 32 threads per inch. Right hand and left hand threads may be tested with identical rollers.

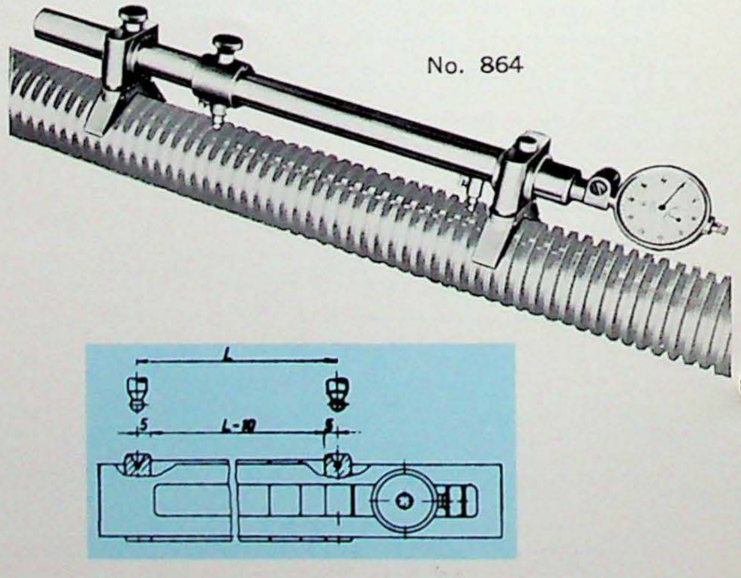
No. 706 Vrg Smooth cylindrical rollers, for checking of cylindrical parts.

For quantity inspection we recommend the use of our Electric Comparators. Refer to pages 16-19.

No. 864 Lead Screw Tester

with interchangeable spherical tips for threads from ¾" to 4" diameter measuring length ¾" to 12", reading in .0005".

For testing pitch accuracy of lead screws. The spring-supported V-supports will accommodate measurements on spindles of various diameters. Errors in the pitch may be read directly on the dial indicator. Coarse adjustment is made by shifting the fixed tip, fine adjustment by turning the indicator dial. Setting may be done with gage blocks using our gage block holders with centers **No. 864 m** as shown in insert of illustration. Lead Screw Testers for greater length and larger diameters can be made to special order.


No. 864

No. 864 e Spherical Tips

for Lead Screw Tester No. 864. They are interchangeable and may be used for pitch of Metric and Whitworth screw threads. They are dimensioned so that they rest on the thread flanks close to the pitch diameter.

Spherical tips No.	III	IV	V	VI	
suitable for	1.25-1.75	2-3	3.5-4.5	5-7.5	mm pitch
suitable for	20-14	14-7	7-4.5	4.5-3	threads per inch

For Acme Threads the following tips are available

for	3	4	5	6	7	8	9	10 mm pitch
or for	8	7	6	5	4	3	2.5	2 threads per inch

Mahr INDICATING THREAD PLUG GAGE

No. 705 V Indicating Thread Plug Gage

With interchangeable Measuring Segments, reading in .0005″, in ranges from .080″ to 4.800″.

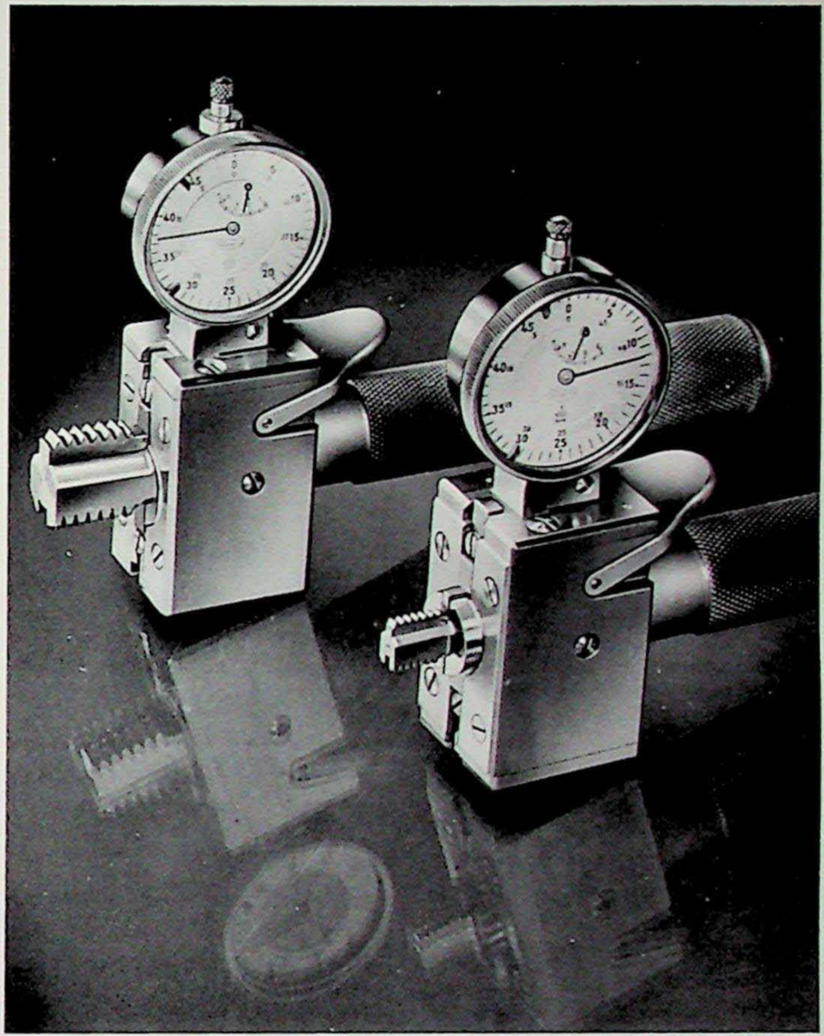
The MAHR Indicating Thread Plug Gage is an ADJUSTABLE THREAD PLUG GAGE.

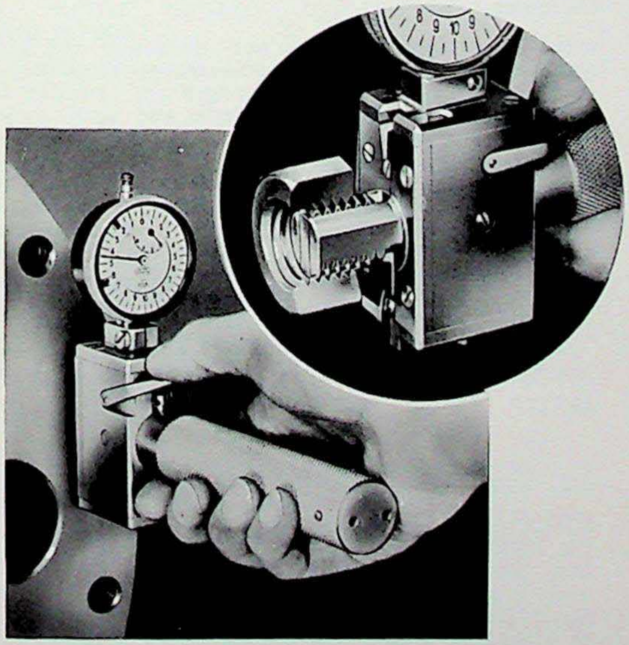
The measuring device consists of three flat thread segments which represent a cut-up section from a GO-Thread Plug Gage, flattened on the sides. Two of the segments are fastened to the gage body while the third one in center can be moved between the two outer fixed segments by means of a thumb lever. With the center member retracted the gage is inserted into the threaded bore and centers itself automatically upon release of the thumb lever. The segments engage the thread throughout the length of the thread. The motions of the center member are transmitted to the dial indicator which tells the position of the two outer segment members at each gaging. The gage is set to the lower tolerance by a thread ring gage. If one tolerance marker is set to this measurement and the other to the upper tolerance the thread to be tested is within tolerances if the hand of the dial indicator stays between the tolerance markers.

The segments usually have the full thread profile like a GO-Thread Plug Gage. In gaging, the result is the over-all or composite of all dimensions making up the thread. Thus the error showing up on the indicator is a combination of errors in pitch diameter, thread angle, lead and profile. In gaging large quantities, it is nearly always sufficient to ascertain this composite error. The measuring segments can be designed with only one or two threads and shortened sides whereby pitch diameter alone can be gaged excluding errors in lead and profile.

Mahr Indicating Thread Plug Gages offer greater RELIABILITY since the measuring result can be read in numerical values and measuring feel of the operator has no influence on the gaging.

There is practically no WEAR since measuring faces contact work only in ultimate measuring position and insertion is not subject to friction.





Mahr Indicating Thread Plug Gages

ELIMINATE

threading in and threading out of Go and NoGo gages, as well as possible abuse and forcing of expensive thread gaging equipment resulting in excessive wear which makes replacement necessary.

Specifications:

No. 705 V Indicating Thread Plug Gage, with interchangeable measuring segments, furnished with shockproof dial indicator No. 803 STZ, reading in .0005″.

Range: .080″-.200″ .200″-1.030″ 1.030″-2.050″
2.050″-4.800″

Including black hardwood case, but without Measuring Segments. Select Measuring Segments from the following specifications.

No. 705 Vm Interchangeable Measuring Segments, each set consisting of 3 members.

Size	Size	Size
No. 3 - 8	1-1/4″ - 1-3/8″	2-5/8″ - 2-3/4″
No. 10 - 1/4″	1-7/16″ - 1-9/16″	2-13/16″ - 2-15/16″
5/16″ - 3/8″	1-5/8″ - 1-3/4″	3″ - 3-1/8″
7/16″ - 9/16″	1-13/16″ - 2-1/16″	3-1/4″ - 3-1/2″
5/8″ - 3/4″	2-1/8″ - 2-3/16″	3-5/8″ - 3-7/8″
7/8″ - 1″	2-1/4″ - 2-3/8″	4″ - 4-1/2″
1-1/16″ - 1-3/16″	2-7/16″ - 2-9/16″	over 4-1/2″

When ordering these segments, specify thread type, thread size and class.

One set consisting of 3 members is required for each thread type and each thread size.

No. 844 Vm Interchangeable Measuring Segments with **cylindrical faces** for the measuring of smooth bores or minor diameters of nuts are available (refer to page 39).

METRIC available.

No. 40 S Super Micrometer

Extra rigid, satin chrome finished with sensitive ratchet stop and clamp ring, reading in .0001" by vernier.

MAHR Super Micrometers are of extraordinary quality and workmanship. Measuring spindle is hardened throughout. Spindle diameter .300". Frames are of drop forged steel. Jet black graduations and numerals permit fast and errorless readings. Thermal insulation inserts prevent distortion by heat from hand. TUNGSTEN CARBIDE tipping of measuring anvils is **optionally** available. Micrometers over 4" have 2" measuring range, namely 1" by travel of micrometer screw and by 2 interchangeable fixed anvils differing by 1" in length.

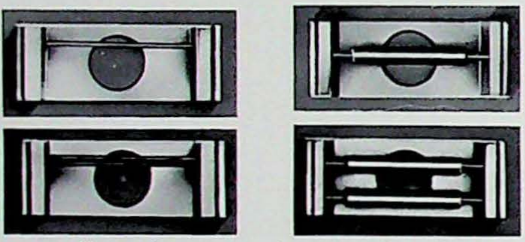
Specifications: **No. 40 S**

Range: **0"-1"** **1"-2"** **2"-3"** **3"-4"** **4"-6"** **6"-8"**

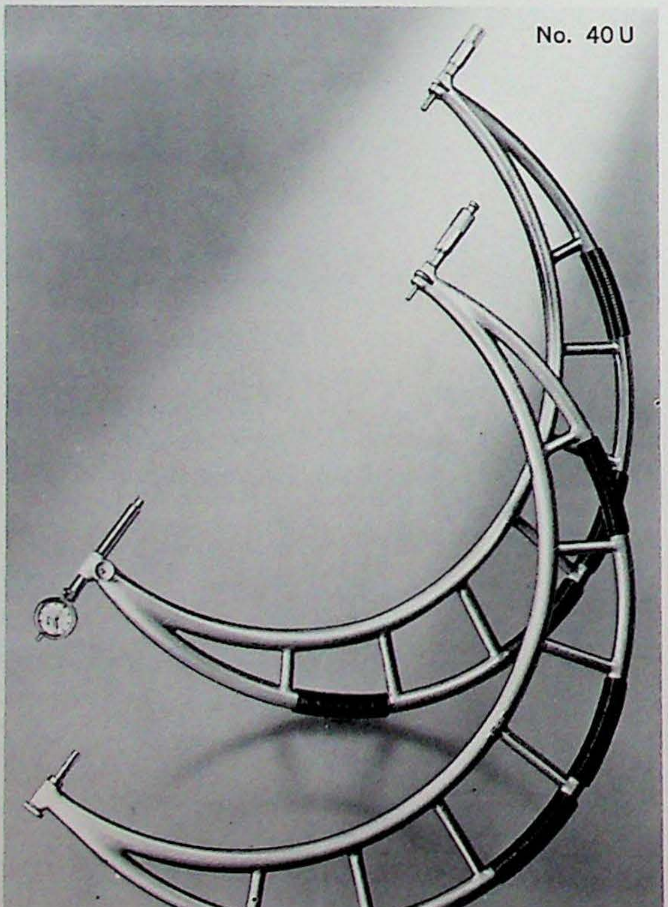
Wooden cases for these micrometers are optionally available.

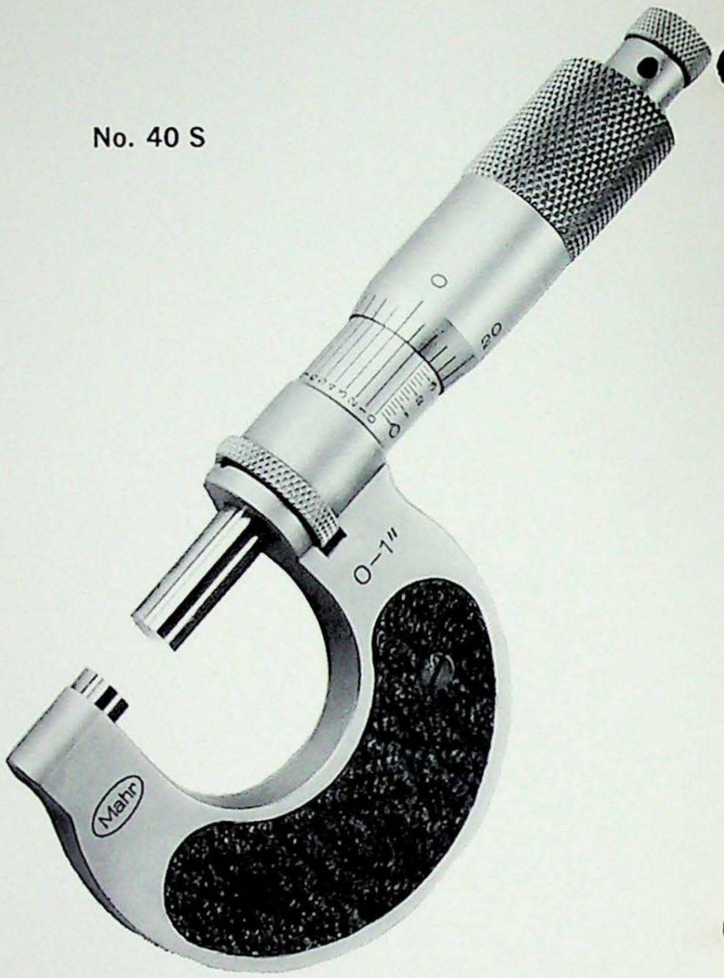
METRIC sizes available.

Complete Super Micrometer Sets for measuring ranges 0-3", 0-4", 0-6" and 0-8" are available. Request quotation



For wire measuring by the three wire method, Thread Measuring Wires with holders to fit the anvils of the No. 40S Super Micrometer can be furnished. Refer to page 62




No. 40 S

No. 40 W Precision Micrometer

For large diameters, reading in .001". Micrometer head satin chrome finished. Other features identical with our Super Micrometer.

With ratchet stop and lock nut. Hardened and ground screw, spindle .315" diameter, spindle travel 1". Four interchangeable anvils differing by 1" in length are provided to give each micrometer a range of 4". Screw and anvil may be readily re-adjusted if worn. The frames up to 12" range are made of high grade iron castings. From 12" upward, they are made of tubular steel as illustrated. These frames are nearly as lightweight as aluminum frames without sacrificing rigidity and without their drawback with regard to thermal expansion and low strength. The micrometers are provided with thermal insulating grips.

Specifications: **No. 40 W**

Range: **0"-4"** **4"-8"** **8"-12"** **12"-16"** **16"-20"** **20"-24"** **24"-28"** **28"-32"** **32"-36"** **36"-40"** **40"-44"** **44"-48"** **48"-52"** **52"-56"** **56"-60"**

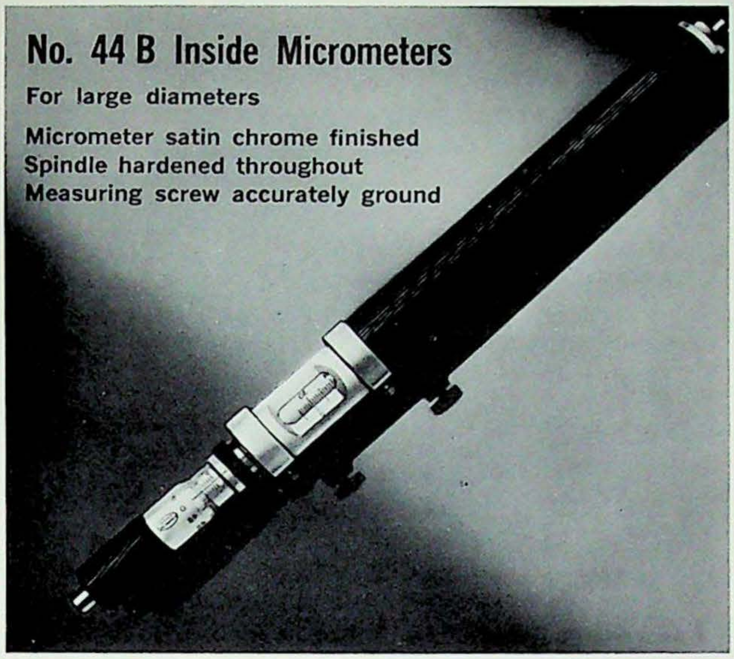
No. 40 U Precision Micrometers with Dial Indicator

Design same as in No. 40 W except that a sliding bar replaces the interchangeable anvils. The sliding bar accommodates a Dial Indicator No. 803STZ, reading in .0005" and provides uniform measuring pressure for its measuring anvil namely about 2 lbs., thus making the measuring result independent of the personal feel and skill of the operator. The sliding bar permits lengthwise adjustment of 4" and can be securely locked into position by knurled screw. The measuring anvil can be conveniently retracted by a lever.

Measuring ranges are identical as in No. 40 W.

Setting standard (Micrometer Setting Standards No. 43) are listed in price list. For thread measuring, these micrometers can be furnished with bores in anvil and spindle for inserting interchangeable anvils. Refer to page 46 (Catalog No. 40 WZ and 40 UZ.)

Mahr INSIDE MICROMETERS AND MICROMETER HEADS



No. 44 B Inside Micrometers

For large diameters

Micrometer satin chrome finished
Spindle hardened throughout
Measuring screw accurately ground

The No. 44 B Inside Micrometer consists of two telescoping tubes. One of these, accurately divided for the full, adjustable range, can be set to the precision index lines on the other and locked in place. The measurement is made with a micrometer head with clamp ring and a measuring range of 1″; its scale divisions are .001″. The anvils are carefully hardened, spherically ground and lapped and may be adjusted at one end of the measuring head unscrewing the jawnut.

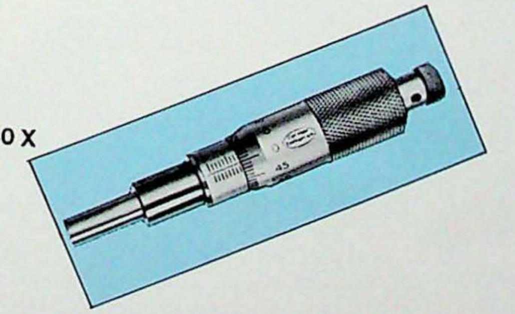
This Inside Micrometer has a protective plastic coating over the entire length of the outer tube to prevent thermal heat transfer from the hand. This coat also prevents corrosion of the guide tube.

Specifications: **No. 44 B**

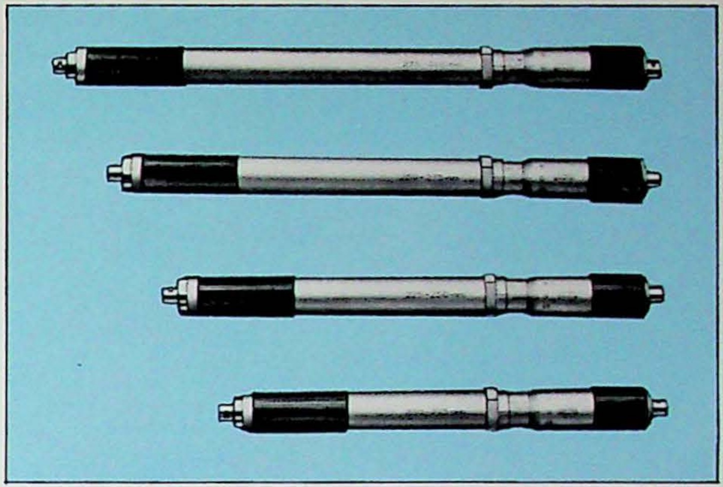
Range 12″-16″ 16″-24″ 24″-40″
40″-68″ 68″-100″ 100″-160″
Reading in .001″

METRIC graduation available.

No. 40 X



No. 40 XH



No. 44 F Precision Inside Micrometers

Satin chrome finished
Spindle hardened throughout
Measuring screw accurately ground

From 4″ on up, these micrometers are provided with a clamp ring which locks the screw in the desired position by simply turning to either side. Thermal insulating grips are provided for these micrometers from 4″ on up.

Lightweight and yet rigid construction is of permanent importance. Even the larger models are light enough to insure handiness and measuring accuracy. The faces are spherical, carefully hardened and lapped. The anvil pin, at one end, is threaded and provided with a jam nut. Take-up for wear of the spindle screw is made with the re-adjustable nut, as with micrometers.

Specifications: **No. 44 F**

Measuring range: **2″-2¾″ 2¾″-4″ 4″-5″** and so on, increasing by 1″ up to 40″.
Reading in .001″.

METRIC graduations available.

No. 40 X Micrometer Heads

Of Super Micrometer quality. Sturdy, satin chrome finished construction. Spindle hardened throughout. Measuring screw accurately ground, reading in .0001″.

With sensitive ratchet stop. These micrometer heads may be incorporated into machines and measuring devices of all kinds. They are supplied in the following versions:

Specifications:	No. 40 X With Standard Thimble With Rotating Spindle	No. 40 XH With Extra Large Thimble With Non-Rotating Spindle
Reading in	.0001″ (by vernier)	.0001″ (directly)
Measuring range	1″	1″
Thimble diameter	11/16″	1¾″
Length of mounting shank	⅝″	13/16″
Diameter of mounting shank	.472″	.472″

METRIC graduation available.

Mahr DEPTH MICROMETER AND DEPTH GAGE

No. 45 T. Depth Micrometer

With interchangeable measuring anvils

Graduation	.001″
Range	4″
Length of base	4″

Standard Anvil is tungsten carbide tipped.

Measuring Anvils and flat surface of base fully hardened.

Thimble, barrel and base satin chrome finished.

This Depth Micrometer is equipped with interchangeable anvils and extensions, which can be combined to form any desired length. This design makes the tool very versatile, suitable for special measuring applications such as width of grooves in bores, in addition to ordinary depth measuring. The friction stop in the micrometer head works in both directions, resulting in reliable measurements at all times.

Measuring Ranges:

With anvil only (without extensions)	0-1″
With anvil and extension 1″	1-2″
With anvil and extension 2″	2-3″
With anvil and extensions 1″ plus 2″	3-4″

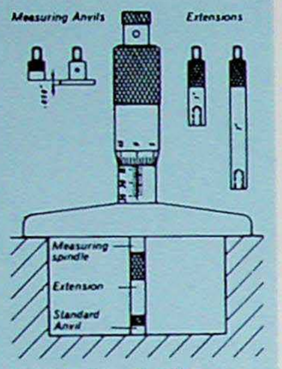
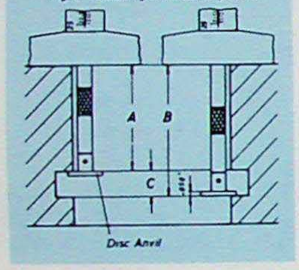


Fig 1. Ordinary Depth Measuring

Fig 2. Measuring the width of grooves



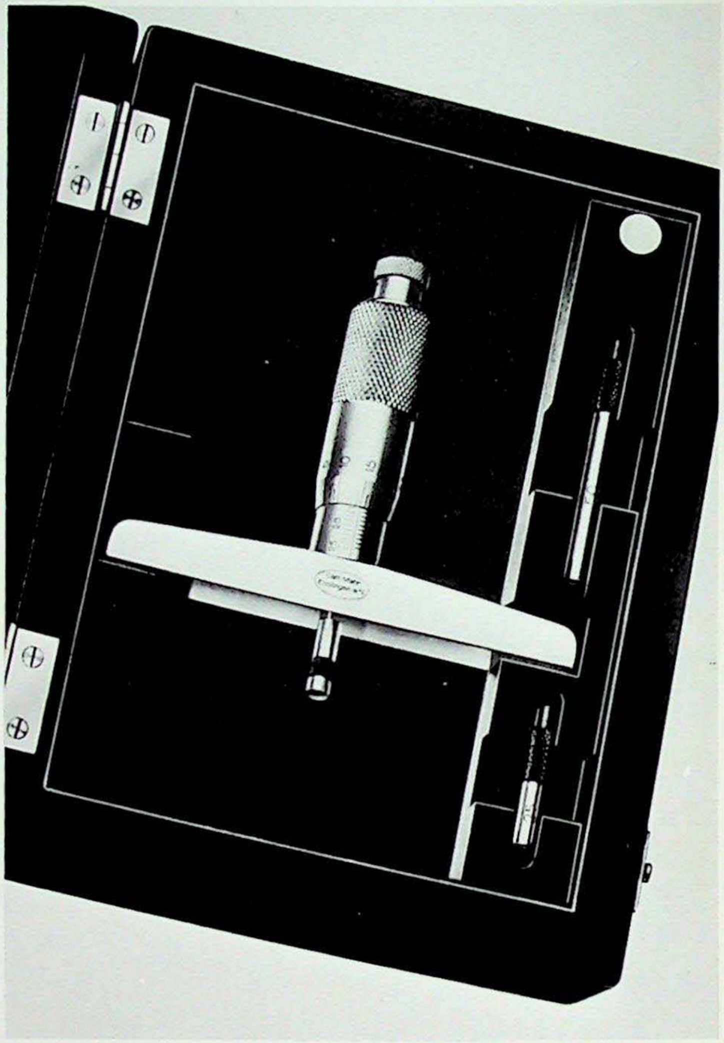
Application:

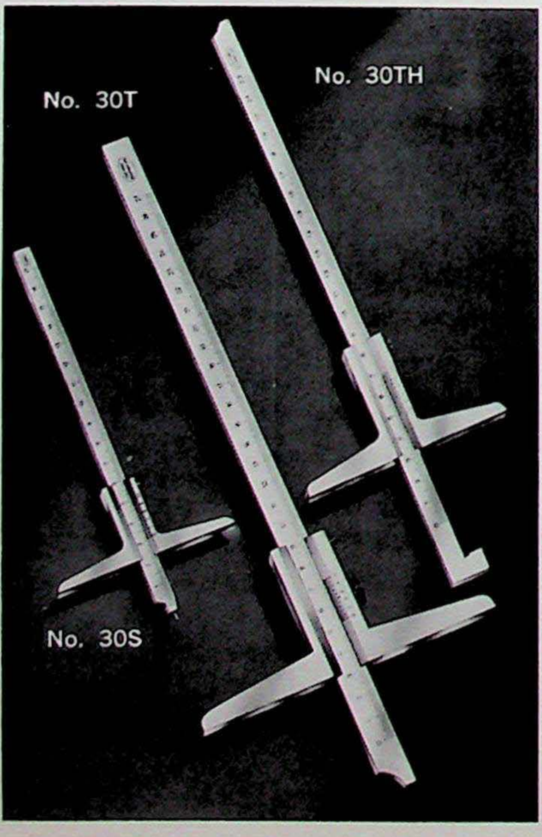
Ordinary Depth Measurements (fig. 1)
Depth Micrometer is used with **standard anvil** and—if necessary—with extensions.

Measuring of the width of grooves (fig. 2)
Depth Micrometer is used with **disc anvil** diameter .35″ (Cat. No. 45 Tm) to determine the distances A and B. Extensions may be inserted if necessary.

Dimension A: Can be read directly on micrometer head.
Dimension B: The thickness of the measuring disc anvil of **.050″ must be added** to the reading.
Dimension C: Is determined by subtracting A from B.

METRIC graduations available.





No. 30 S. Depth Gage with interchangeable wire point

Extra light and convenient construction
Scale and vernier: Readings by 1/1000″

Measuring range	**6″**
Length of base	3⅛″
Cross-section of measuring rod	.320″×.100″

METRIC graduations available.

No. 30 T. Depth Gage Made entirely from steel, with open slide

Measuring rods hardened
Scale and vernier: Readings by 1/1000″

Measuring range	**inches**	6	8	12	20
Length of base	inches	3⅛	4	6¼	8

METRIC graduations available.

No. 30 TH. Depth Gages with hook rod

In this type of depth gage, the rod has a small offset tip at the end, which permits the measuring of grooves and recesses. The rod has scales on both front and back and can be reversed for ordinary depth measuring.

The model No. 30 TH Depth Gages are only available with millimeter graduations, in the following ranges:

200 300 500 mm

Mahr HEIGHT GAGE AND VERNIER CALIPERS

No. 27 SZ Precision Vernier Height Gage

Extra heavy construction

For precision measuring and layout work.

The base is of especially sturdy design. Its hardened underside is precision lapped and permits an easy, smooth sliding motion. The top is recessed for comfortable gripping.

The beam with an extra large cross section has a newly designed, extra strong attachment to the base. This guarantees utmost rigidity and protection from vibrations.

The extra long slide has most accurate guide ways and fine adjustment screw.

The scriber is hardened and lapped. Easily interchangeable, can be supplied optionally TUNGSTEN CARBIDE tipped. The design of this Height Gage permits the setting of the scriber arm to zero, eliminating an offset scriber.

Satin Chromed Scales and Verniers permit glare-free readings. Recessed Scale protects scale divisions against frictional damage and scratches.

Easy to read. The extra long vernier has 50 scale divisions; the main scale has 20 divisions to the inch, .050" wide.

Guaranteed accurate measurements to .001".

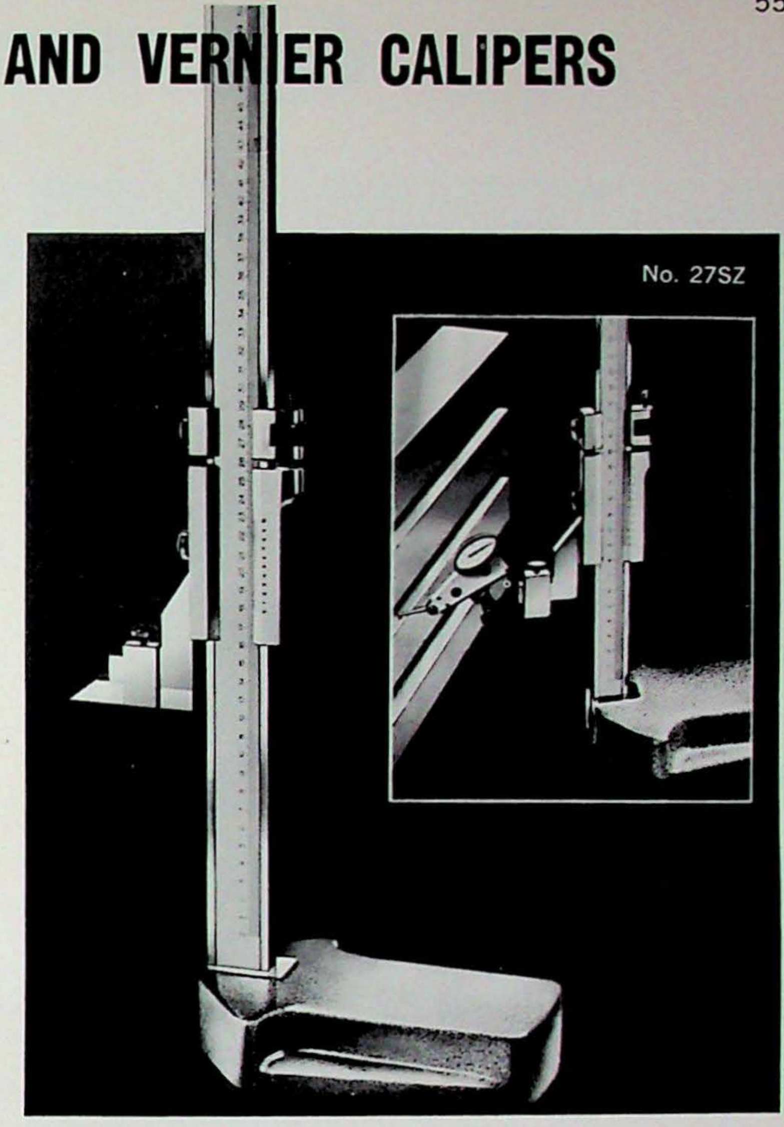
Specifications: No. 27 SZ, reading in .001"

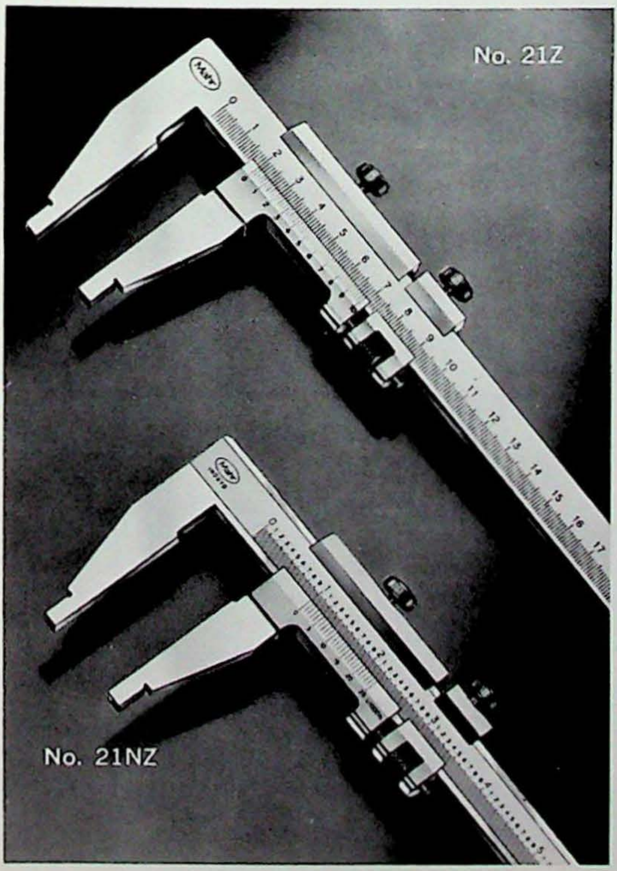
Measuring range:	12"	20"	30"
Cross section of beam	⅞x¼"	1⅜x½"	1⅜x½"
Size of base	5¾x4"	7½x5⅛"	7½x5⅛"
Weight	6 lbs.	16 lbs.	18 lbs.

Black finished hardwood cases optionally available.

METRIC graduations available.

No. 27 SP Indicator Holder for mounting of Universal Test Indicator "Puppitast" No. 800 SZ (described on page 10). See insert.





No. 21 Z Precision Vernier Calipers

Made of steel, hardened throughout. Faces precision ground and lapped to a high polish. The bar is accurately ground and assures parallelism of the jaws over the entire range. Adjustable bronze spring gib permits simple adjustment of slide. The outsides of the jaws are radiused for inside measurements. Micrometer screw for fine adjustment. The open slide which carries the vernier gives an unobstructed view of the main scale.

The graduation lines are sharp-edged and deeply cut, clearly readable with the unaided eye. The numbers are engraved.

No. 21 NZ Super Vernier Calipers

They resemble in design the Precision Vernier Calipers #21Z but offer these additional features:

Stainless steel.

Satin chromed scales and verniers, permitting easy reading and eliminating glare

Recessed Main Scale, protecting graduation lines from damage and scratches when moving slide

Raised guiding edges make the movements of the slide soft and smooth

Hardened throughout, minimizing wear.

Specifications:

No. 21 Z and 21 NZ for readings in .001"

Measuring range	10"	12"	20"	30"	40"
Length of jaws	2¾"	2¾"	3⅛"	4"	4¾"

Black finished hardwood cases are optionally available.

METRIC graduations available.

Mahr VERNIER CALIPERS

No. 19 NZ Toolmaker Vernier Caliper

Made of stainless steel, hardened throughout, with micrometer adjustment, guaranteed accurate measurements to .001″.

Dull chrome faced main and vernier scales for easy reading. Extra long vernier. Machine divided graduations. A radically new raised edge design to give full and lasting protection to this surface—the raised edges acting as guideway for the vernier scale.

Specifications:

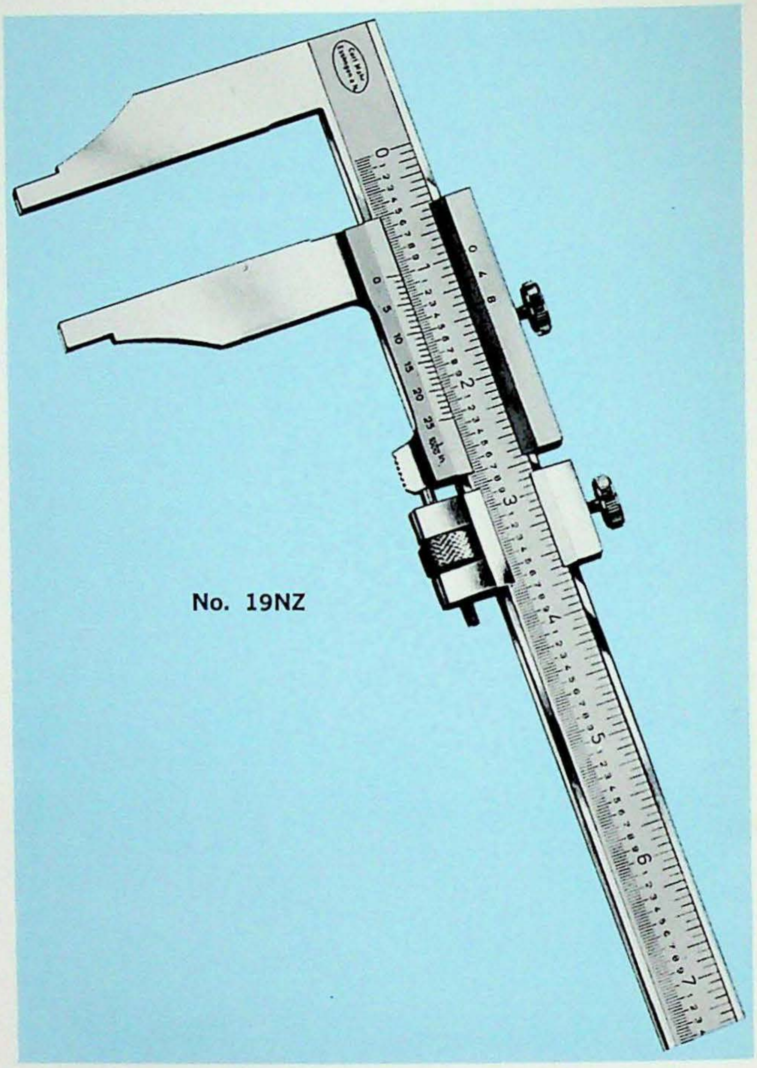
No. 19 NZ Toolmaker Caliper, with micrometer adjustment

Measuring capacity:	7″	9″	11″	20″	30″	40″
Length of jaws:	2 9/16	3″	3 9/16″	6″	6″	6″

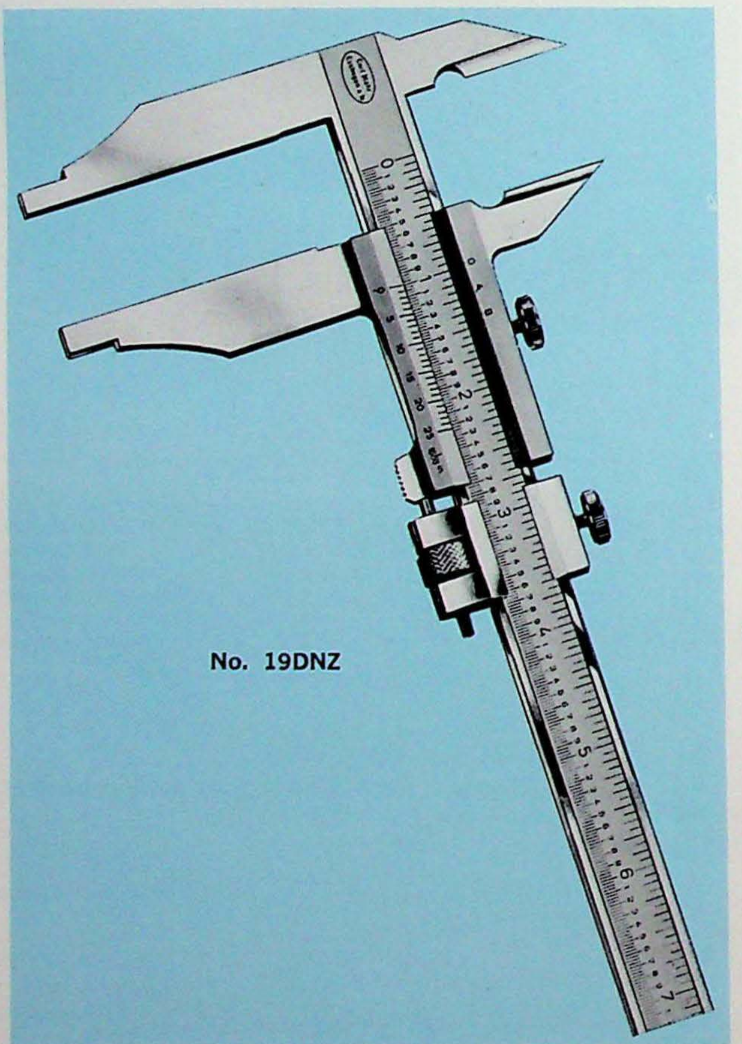
Optionally available: Black hardwood cases for same.

GRADUATIONS: 1/1000″ on lower scale
1/128″ on upper scale

METRIC graduations available.



No. 19NZ



No. 19DNZ

No. 19DNZ Toolmaker Caliper, with micrometer adjustment and equipped with knife edges for measuring root, threads and for dividing.

Measuring capacity:	7″	9″	11″	20″	30″	40″
Length of jaws:	2 9/16	3″	3 9/16″	6″	6″	6″

Optionally available: Black hardwood cases for same.

GRADUATIONS: 1/1000″ on lower scale
1/128″ on upper scale

METRIC graduations available.

Also available:

No. 17 D Vernier Caliper, (not illustrated) made of special wear-resisting steel, measuring surfaces hardened, with hardened knife edge blades and scriber points. One piece bar and jaw. These verniers are not dullchrome finished.

Specifications:

No. 17 D, with micrometer adjustment:
60″ 80″ Measuring Range

Graduations: lower scale 1/1000″
upper scale 1/128″

Metric Graduations available. No cases available for these Vernier Calipers.

Mahr BEVEL PROTRACTOR

No. 106U UNIVERSAL BEVEL PROTRACTOR

FOR PARALLAXFREE READINGS
STAINLESS STEEL
SCALE AND VERNIER SATIN CHROME FINISHED

This Bevel Protractor may be set to any angle. The vernier disc and the moveable blade may be locked by knurled screw.

The dial is provided with graduations covering the full circle of 360°. The vernier reads 1/12° = 5′.

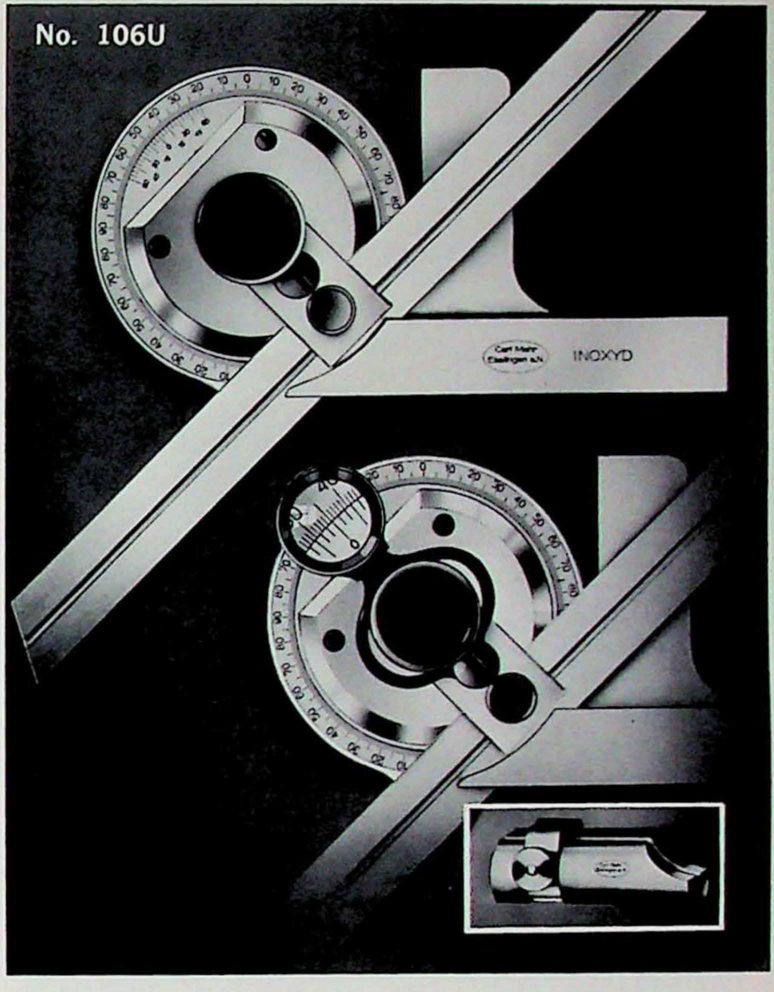
Flush fitting of vernier and scale, both in the same plane, eliminates reading errors caused by parallax and ensures exact alignment of matching lines on scale and vernier. Non-glare satin chrome finish of scale and vernier provide better reading in any light without eye strain.

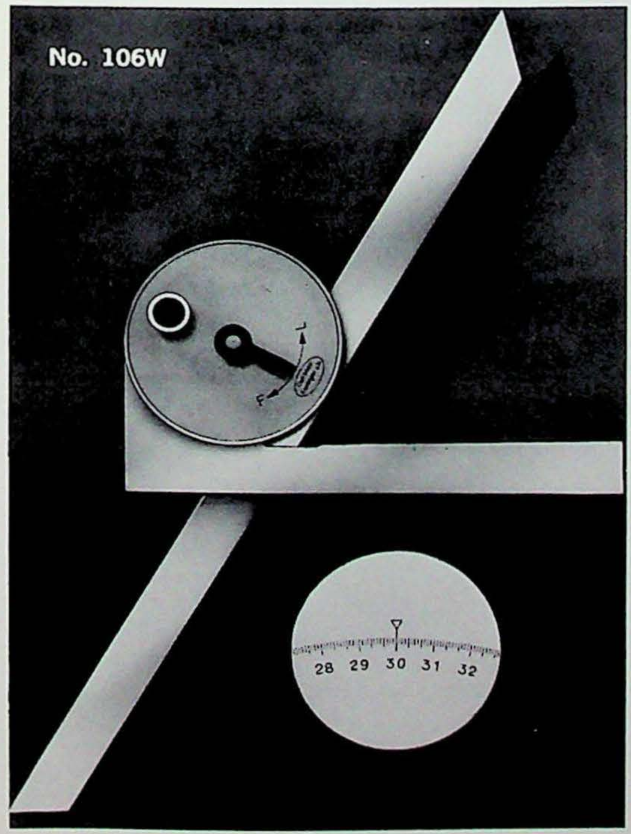
Length of blade	6″	8″	12″

Black finished wooden case } optionally
Extra Measuring Blade } available

ACCESSORIES, Optionally Available

No. 106Ua	Adjustable Magnifier (as illustrated) to fit Bevel Protractor ....
No. 106Uv	Base for holding the Universal Bevel Protractor. The bottom, plane face and V for cylindrical work, is accurately aligned with the clamp slot for the protractor ....
No. 106Uw	Acute Angle Attachment for fast and accurate checking of small angles. Easily mounted on fixed side of protractor ....





No. 106 W Optical Bevel Protractor

Stainless Steel
Dullchromed Housing
with very clear and easy to read scale

Range		360°	
Readings by		5′ of arc	
Accuracy		± 5″ of arc	
Length of blades	inches	6	12

This Bevel Protractor permits the accurate and fast determination of any angle. The scale, set into a sturdy steel housing as protection against outside disturbance, has circular divisions of 4×90°, with each division subdivided into 12 graduation lines. This makes direct readings by 5′ without Vernier possible. The wide spaces between graduation lines permit the estimation of fractions with accuracy. Readings of measurements are taken through an ocular with 30 × magnification.

The blade is clamped tight or loosened by a lever in the center of the housing. By rotating of the knurled outer ring the setting or measurement of an angle may be firmly locked. The ocular for optical reading can be focused to the eyesight of the user.

Mahr PRECISION LEVELS

No. 108 M PRECISION LEVEL

With longitudinal and traverse level vials with very accurately ground inverted V and plane faces.

The level bases are made of high grade seasoned castings, carefully aged by a special process, resulting in maximum wear resistance. Accurately ground on the bearing surface. Greatest care has been taken to provide strain-free mounting of the ether-filled precision ground and polished hard glass vials, assuring stability of the positioning of the vials.

Specifications:

Length	6¼"	8"	10"	12"
Width	1¾"	2"	2¼"	2½"

Sensitivity of the longitudinal level vial:

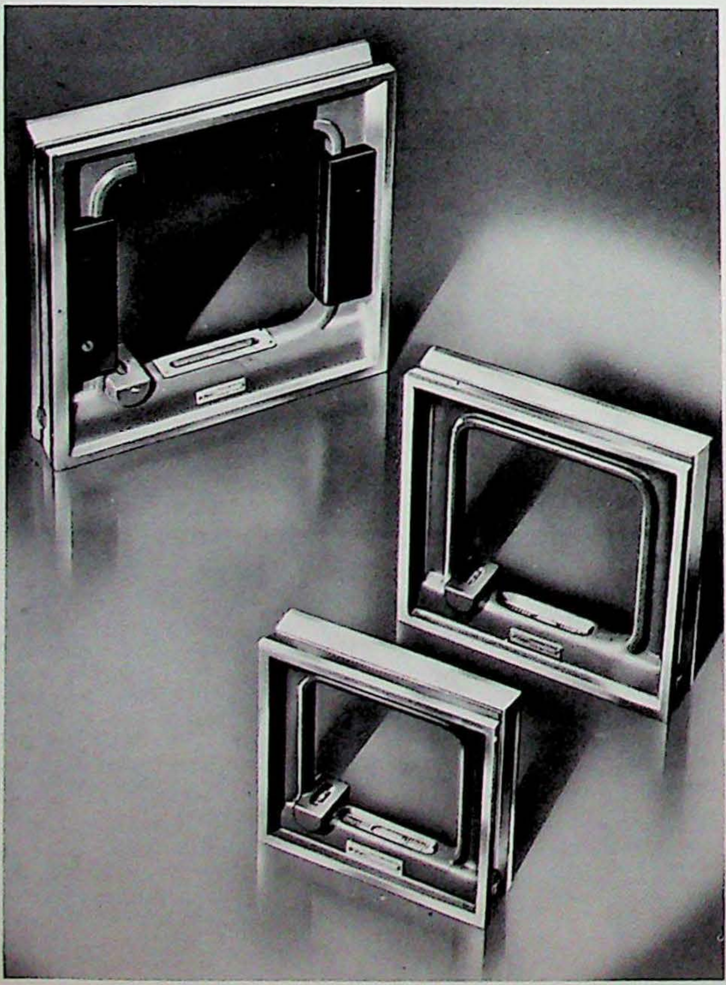
No. 108Ma 1 scale reading = .001" per foot
No. 108Mb 1 scale reading = .0005" per foot
No. 108Mc 1 scale reading = .00025" per foot

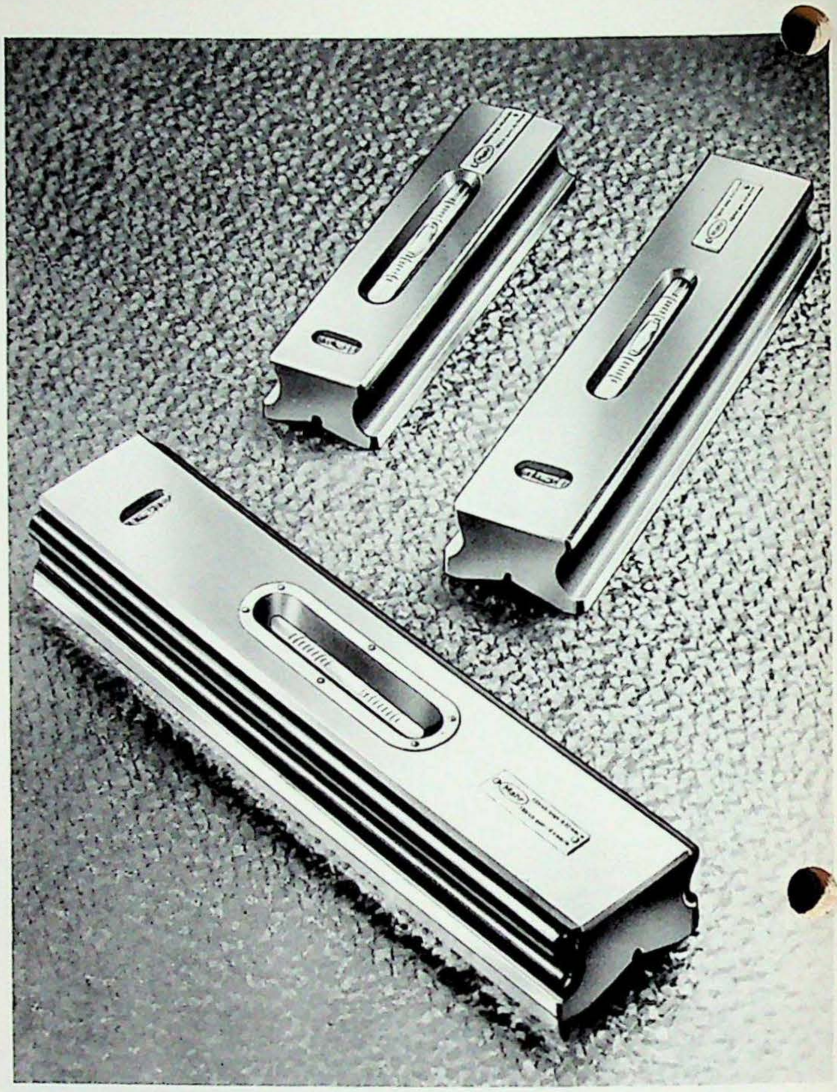
Furnished with Wooden Case.

METRIC scales available.

Note:

All No. 108Mc HIGH PRECISION LEVELS having a sensitivity of .00025" per ft. require constant temperature of 68° F, greatest cleanliness, thermal insulation against heat transfer from the hand and body, protection from drafts and careful handling. Their frames as well as the level vials are protected against heat transfer by thermally insulated handles.





No. 108 R PRECISION FRAME LEVEL

With longitudinal and traverse level vials with three V-faces and one plane face, all faces most accurately ground. .

The level frames are made of high grade seasoned castings, carefully aged by a special process, resulting in maximum wear resistance. Accurately ground on the bearing surface. Greatest care has been taken to provide strain-free mounting of the ether-filled precision ground and polished hard glass vials, assuring stability of the positioning of the vials.

Specifications:

Length of one side	6"	8"	10"
Width	1⅜"	1½"	1¾"

Sensitivity of longitudinal vials:

No. 108Ra 1 scale reading = .001" per foot
No. 108Rb 1 scale reading = .0005" per foot
No. 108Rc 1 scale reading = .00025" per foot

METRIC scales available. Furnished with Wooden Case.

Note:

All No. 108Rc HIGH PRECISION LEVELS having a sensitivity of .00025" per foot require constant temperature of 68° F, greatest cleanliness, thermal insulation against heat transfer from the hand and body, protection from drafts and careful handling. Their frames as well as the level vials are protected against heat transfer by thermally insulated handles.

Mahr STEEL SQUARES

Hardened Squares

Squares 105 Y and 105 Z are carefully hardened. All faces and edges are precision ground and adjusted. These squares are extremely valuable both in workshop and inspection room.

No. 105 Z. Hardened Squares with thin blade and wide beam

stainless steel

Carefully hardened, edges and faces precision ground, for accuracy, see specification below.

Blade length inches 3x2 4x2¾ 6x4 8x5
11¾x8 19¾x13

No. 105 Y. Hardened Squares with Bevelled Edges

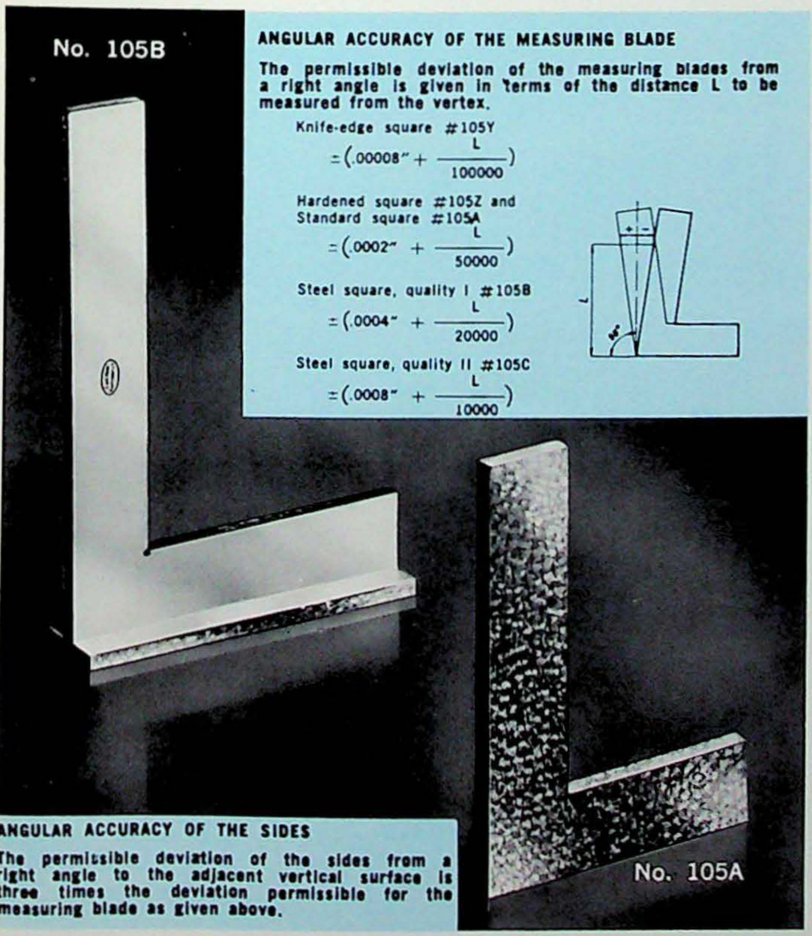
stainless steel

Carefully hardened, edges and faces precision ground, for accuracy, see specification below.

The short blade is grooved for holding

Blade length inches 2x1½ 3x2 4x2¾ 6x4
8x5 11¾x8

These squares are furnished in wooden cases.



ANGULAR ACCURACY OF THE MEASURING BLADE

The permissible deviation of the measuring blades from a right angle is given in terms of the distance L to be measured from the vertex.

Knife-edge square #105Y

$$\pm\left(.00008'' + \frac{L}{100000}\right)$$

Hardened square #105Z and
Standard square #105A

$$\pm\left(.0002'' + \frac{L}{50000}\right)$$

Steel square, quality I #105B

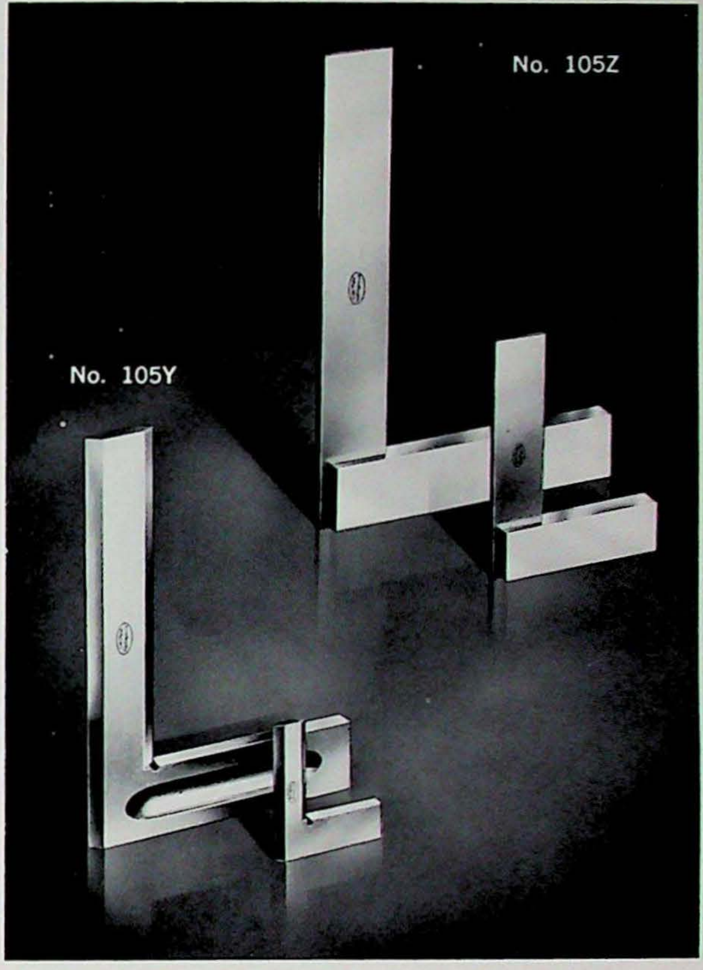
$$\pm\left(.0004'' + \frac{L}{20000}\right)$$

Steel square, quality II #105C

$$\pm\left(.0008'' + \frac{L}{10000}\right)$$

ANGULAR ACCURACY OF THE SIDES

The permissible deviation of the sides from a right angle to the adjacent vertical surface is three times the deviation permissible for the measuring blade as given above.



No. 105 A. Standard Squares*

Accuracy see specifications

Scraped all over. All faces absolutely parallel. Finest quality high accuracy inspection tools.

Length of blades inches 4x2¾ 6x4 8x5 10x6½
11¾x8 19¾x13 29½x19¾ 39½x26

No. 105 B. Steel Squares*

Quality I, see specifications

Edges precisely scraped, flats carefully finished. Highly recommended for exact work and inspection.

Length of blades inches 4x2¾ 6x4 8x5 10x6½
11¾x8 19¾x13 29½x19¾ 39½x26

No. 105 C. Steel Squares*

Quality II, see specifications

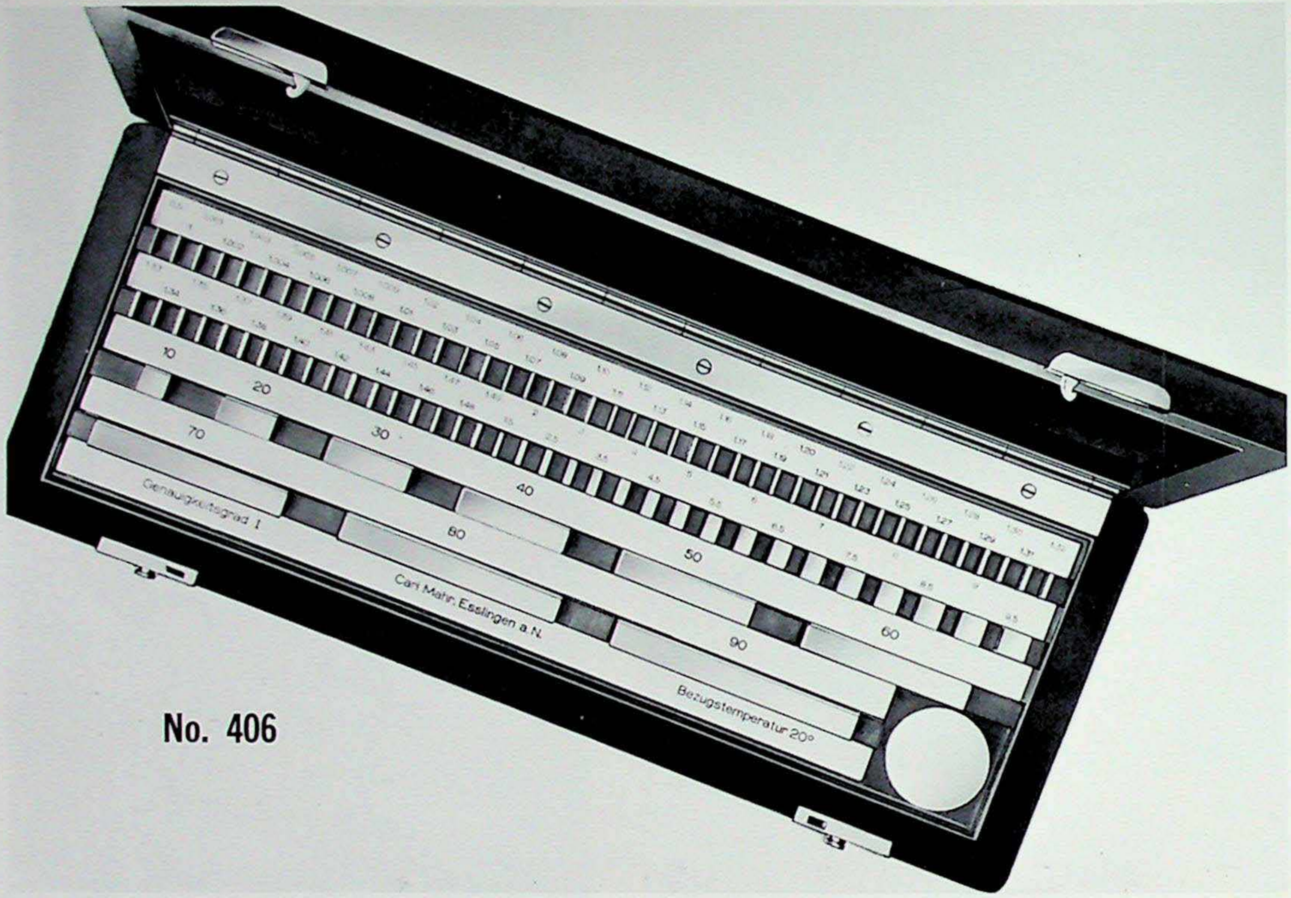
Edges ground accurately, flats carefully finished. General workshop square.

Length of blades inches 4x2¾ 6x4 8x5
10x6½ 11¾x7 19¾x10
29½x14¾ 39½x19¾ 59x29½

**All squares can be furnished with or without flange.*

Furnished without case.

Mahr GAGE BLOCKS IN MILLIMETER SIZES



No. 406

Accuracy

The permissible deviation of MAHR Millimeter Gage Blocks is according to standard specifications DIN 861 page 1, May 1955, Dimensions in μm (1 μm = 1/1000 mm) at 20° C.

Length of Gage Block l mm	Permissible median error f_m		
	Accuracy Grade 0 μm ±	Accuracy Grade I μm ±	Accuracy Grade II μm ±
0.1	—	0.2	0.5
0.5	0.1	0.2	0.5
10	0.12	0.25	0.6
20	0.14	0.3	0.7
30	0.16	0.35	0.8
40	0.18	0.4	0.9
50	0.2	0.45	1.0
60	0.22	0.5	1.1
70	0.24	0.55	1.2
80	0.26	0.6	1.3
90	0.28	0.65	1.4
100	0.3	0.7	1.5

For gage blocks in intermediate lengths the values for the next smaller step apply. Gage Blocks of less than 6 mm thickness must according to DIN 861, when tested, be wrung on to an object having a plane surface and at least 12 mm thickness.

Cross-Sectional Dimensions

Gage Blocks are made with rectangular cross-section. Dimensions are for

nominal size from	0.05	to 0.45	mm	20×9 mm
nominal size from	0.50	to 10	mm	30×9 mm
nominal size over	10	to 500	mm	35×9 mm
nominal size over	500	to 1000	mm	40×9 mm
nominal size over	1000	to 3000	mm	45×9 mm

Mahr Gage Blocks

in Millimeter sizes are furnished in a finished black wooden case. The sizes are engraved on a white plastic insert. A container of Gage Block lubricant is enclosed, as illustrated. Specify in order if Gage Blocks are wanted in Grade 0, I or II.

No. 404 Gage Block Set

consisting of 46 blocks as follows

1.001 — 1.009	in steps of 0.001 mm	9 blocks
1.01 — 1.09	in steps of 0.01 mm	9 blocks
1.1 — 1.9	in steps of 0.1 mm	9 blocks
1 — 9	in steps of 1 mm	9 blocks
10 — 100	in steps of 10 mm	10 blocks
		46 blocks

No. 406 Gage Block Set

consisting of 87 blocks as follows
(as illustrated above.)

0.5		1 block
1.001 — 1.009	in steps of 0.001 mm	9 blocks
1.01 — 1.49	in steps of 0.01 mm	49 blocks
1 — 9.5	in steps of 0.5 mm	18 blocks
10 — 100	in steps of 10 mm	10 blocks
		87 blocks

No. 408 Gage Block Set

consisting of 111 blocks as follows

0.5		1 block
1.001 — 1.009	in steps of 0.001 mm	9 blocks
1.01 — 1.49	in steps of 0.01 mm	49 blocks
1 — 24.5	in steps of 0.5 mm	48 blocks
25 — 100	in steps of 25 mm	4 blocks
		111 blocks

No. 417 Individual Gage Blocks

Gage Blocks can be supplied in every size from 0.05 to 3000 mm in Grade 0, I or II.

Mahr GAGE BLOCKS IN MILLIMETER SIZES

Carbide Gage Blocks

offer increased wear resistance. They can be furnished as follows:

No. 404 H Carbide Gage Block Set, 45 Blocks

Grade 0 or I

This set contains:
32 Carbide Gage Blocks
13 Hardened Steel Gage Blocks
in the following combination:

Carbide Gage Blocks

1.001—1.009 mm, in steps of 0.001 mm	9 blocks	
1.01 —1.09 mm, in steps of 0.01 mm	9 blocks	
1.1 —1.9 mm, in steps of 0.1 mm	9 blocks	
1 block each 1, 2, 3, 4, 5 mm	5 blocks	32 blocks

Hardened Gage Blocks

1 block each 6- 9 mm, in steps of 1 mm	4 blocks	
1 block each 10-90 mm, in steps of 10 mm	9 blocks	13 blocks
		45 blocks

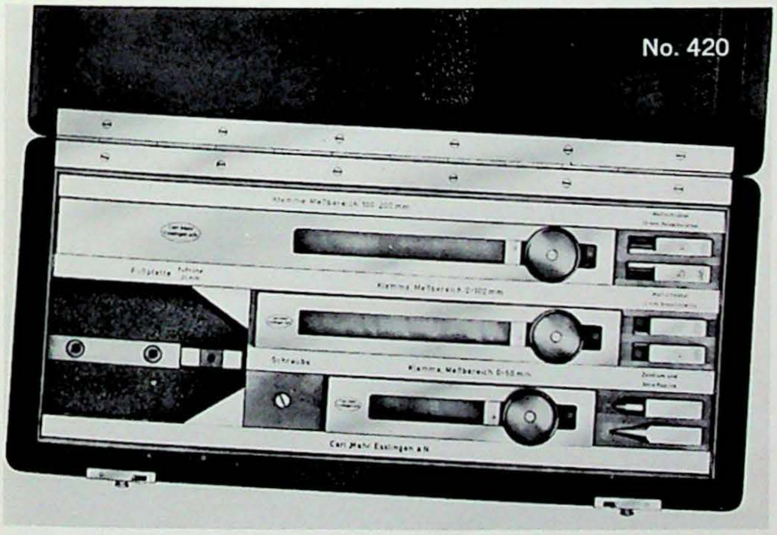
No. 418 Carbide Wear Block Set

Grade I
Size 2 mm
They are furnished **in pairs** in a handsome wooden case.

No. 419 Individual Carbide Wear Blocks

Grade 0 or I
in all sizes from 1 mm to 5 mm

Hartmetall
Carl Mahr Esslingen a.N.



No. 420 Gage Block Accessory Set

To obtain full advantage of our Millimeter Gage Blocks, the use of a Gage Block Accessary set is recommended. This set consists of:

Measuring Jaws for inside and outside measurements:

1 Pair Jaws 2×2 mm = 4 mm
1 Pair Jaws 2×5 mm = 10 mm
1 Scriber
1 Center Point

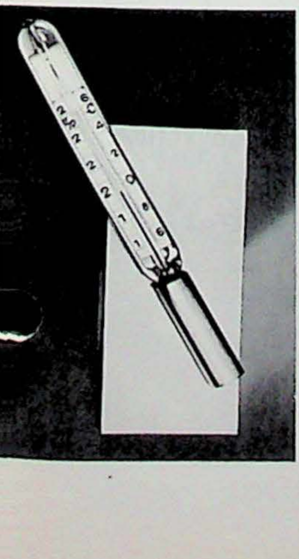
3 Holders for Gage Blocks:

Capacity 0— 50 mm
0—100 mm
100—200 mm

1 Base

hardened, ground and accurately lapped
Height 25 mm (from base to gage block contact face)
The Base, used with a Holder, Gage Blocks and Jaws or Scriber forms an accurate Gage for measuring and scribing with extremely high accuray.

In black wooden case with engraved white plastic inserts.

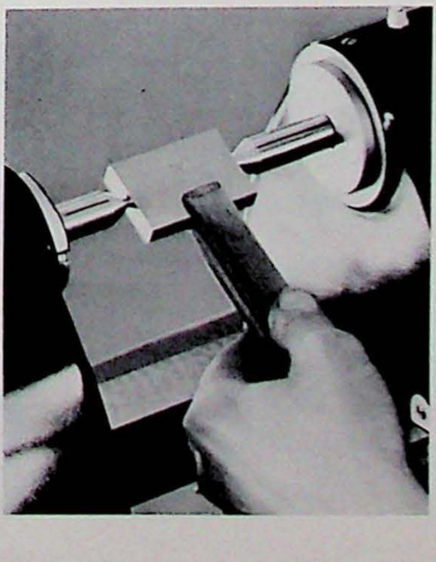


No. 422
Surface Contact Thermometer

with silver contact base

Readings by 1/10° C or 1/5° F
Measuring range + 16 to 26° C
or + 62 to 80° F

For observing the reference temperature of 20° C or 68° F



No. 423 Wooden Tongs

Holding the gage blocks with wooden tongs is recommended in order to prevent heat transfer from the hand.

Mahr THREAD MEASURING WIRES

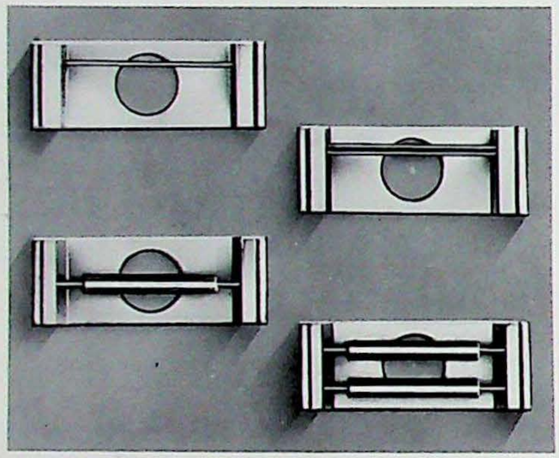
No. 41 Thread Measuring Wires with Holders

Measuring Wires hardened, ground and lapped

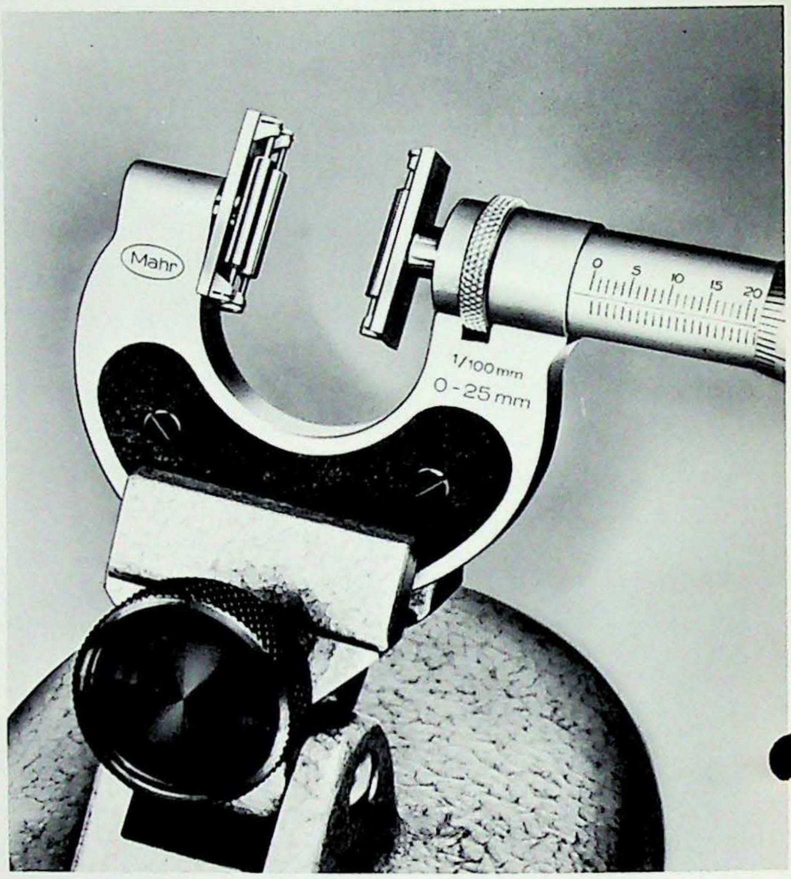
Holder dull-chromed, with mounting bore 7.5 mm diameter (.300″)

For threads up to 2½″ diameter

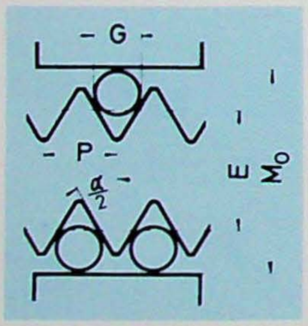
The most accurate way to measure pitch diameter of external threads is the Three Wire Method. Our wire holder will aid this procedure by freeing hands of operator for holding the work. The holders have a mounting bore to fit anvil and spindle of our Super-Micrometer No. 40S (refer to page 52), our Bench Micrometer No. 40 H and 40 HF (refer to page 5), and our Universal Measuring Machine No. 828 (refer to page 45). The available thread wire diameter and corresponding threads are shown in the table below.



Each set of Thread Wires with Holders consists of a holder with one wire and a holder with two wires.



No. 41 Thread Measuring Wires with Holders mounted into No. 40 S MAHR Super-Micrometer, 0-1″.



$$M_0 = E + \frac{G}{\sin\frac{\alpha}{2}} - \frac{P}{2\,\mathrm{tg}\frac{\alpha}{2}} + G + \delta$$

M_0 = Theoretical measurement at 0 measuring pressure

E = Theoretical Pitch Diameter

$\frac{\alpha}{2}$ = half of pitch angle

P = Pitch

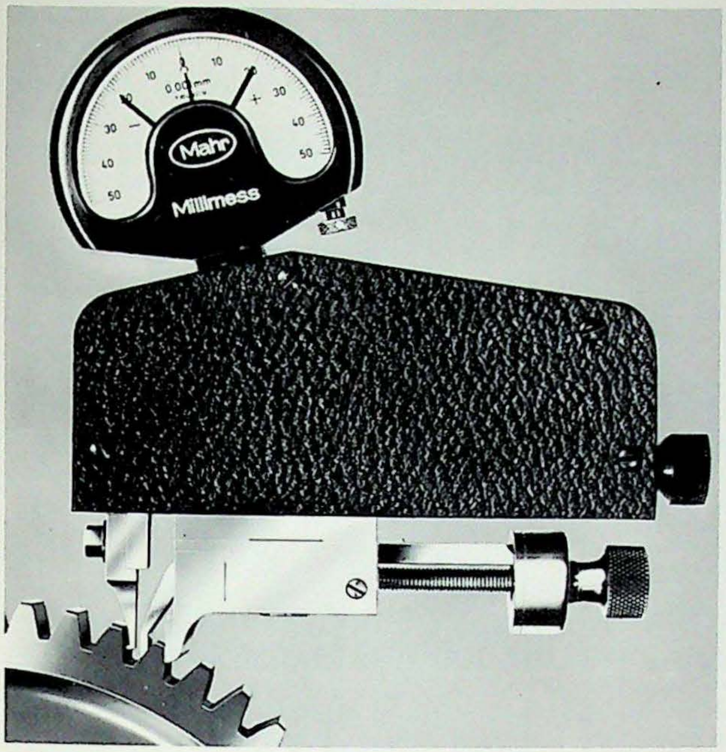
G = Diameter of Wires

δ = Correction factor

$$\delta = \frac{G}{2} \cdot \frac{P^2}{\pi^2} \cdot \frac{\cos\frac{\alpha}{2} \cdot \cot\frac{\alpha}{2}}{E^2}$$

G dia. inches	= dia. mm	Threads p/inch		
.00767	0,195		80	
.00866	0,22		72	
.00984	0,25		64	
.01140	0,29		56	
.01318	0,335		48	
.01535	0,39	44		40
.01791	0,455		36	
.02086	0,53	32		28
.02854	0,725	24		20
.03523	0,895		18	
.04330	1,1	16	14	13
.05314	1,35	12		11
.06496	1,65	10		9
.08070	2,05	8		7
.10040	2,55		6	
.12598	3,2	5		4½

Mahr GEAR TESTING EQUIPMENT



No. 867 Base Pitch Measuring Instrument

For spur gears and gear toothracks with straight and helical teeth, reading in .000050", measuring range: module 0.7-18 or DP 36-1½.

With the Base Pitch Measuring Instrument the base pitch error can be determined and the checking of the uniformity of the base pitch among all teeth can be simply and most accurately performed. Being portable, the instrument may be successfully used for inspecting gears still mounted on the production machine. The Precision Comparator can be interchanged with other models.

Specifications:

No. 867 Base Pitch Measuring Instrument, reading in .000050", range 36-1½ D.P.

No. 867a Interchangeable Measuring Anvils

TYPE	a1	a2	a3	a4
Module	.7-2	Over 2-5	Over 5-10	Over 10-18
D.P.	36-13	12-5½	5-2¾	2½-1½

OPTIONAL ACCESSORIES:

No. 867b Fixed Setting Gages
No. 867c Variable Setting Gages
Gage Block Holders
No. 867t Measuring Stand

Request complete quotation.

No. 887 Disc or Flange Type Micrometer

extra rigid, satin-chrome-finished,
with sensitive ratchet stop and clampring
reading .0001"

Measuring Range:	0-¾ 3¾-4¾	¾-1¾ 4¾-5¾	1¾-2¾ 5¾-6¾	2¾-3¾ 6¾-7¾

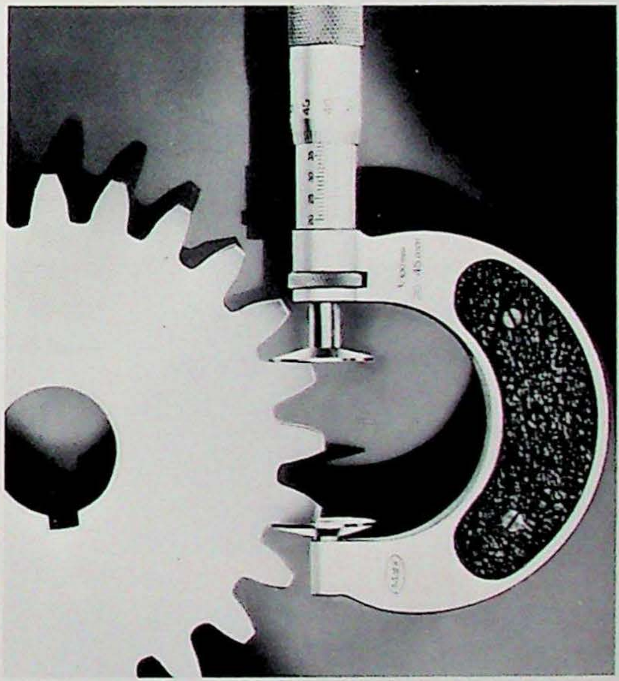
Diameter of flange: Up to measuring range 3¾" = 1"
Above measuring range 3¾" = 1¼"

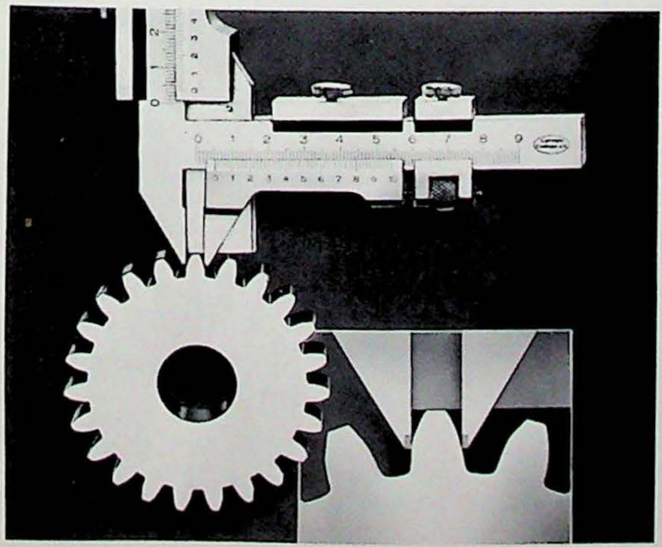
This micrometer is basically the same design as No. 40 S Super Micrometer, described on page 52 except that the measuring anvils are disc-shaped. Spindle and one disc are integral, while second disc replaces conventional micrometer anvil. They are hardened, ground and precision lapped true to each other.

This model has been designed for the accurate measuring of form tools, cutting edges, lands, hard-to-gauge places in general and especially for absolute measurement of tooth thickness on spur gears and helical gears. The extra-large discs make it possible to reach deep into recesses and to measure coarse-pitch gears.

Setting Standards No. 887p furnished optionally for all ranges. Black hardwood cases are optional.

METRIC sizes available.





No. 26 Gear Tooth Vernier Calipers

For measuring of tooth thickness of spur gears, helical gears and bevel gears.

All steel, measuring jaws carefully hardened and precision ground. Long slides with accurate guide ways having adjustable bronze gibs, guaranteeing highest measuring accuracy.

Measuring edges have tungsten carbide faces.

Graduation 1/50 mm or 1/1000".

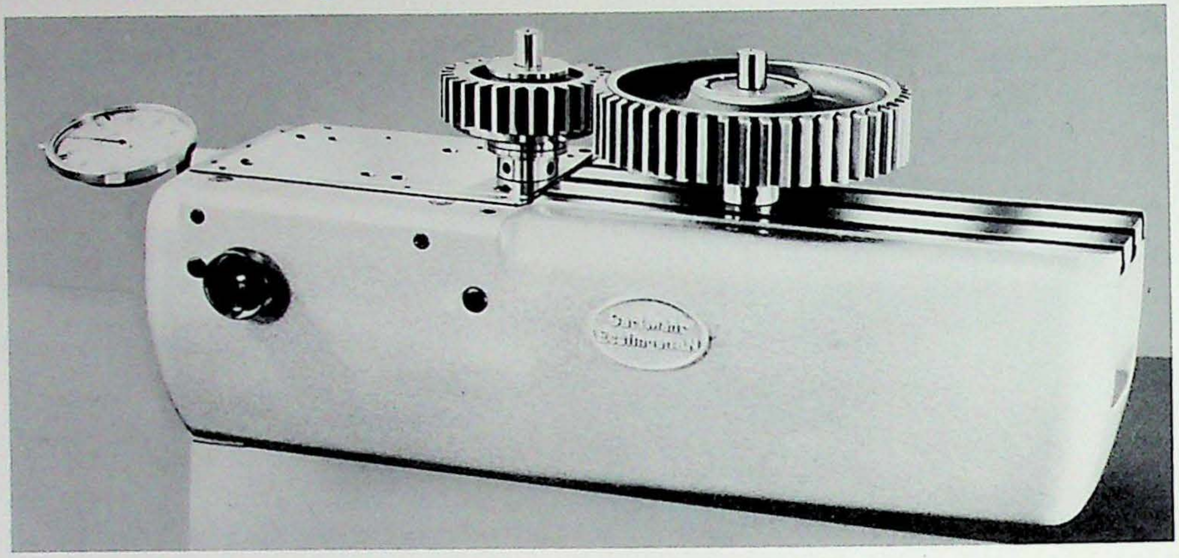
This Vernier Caliper is designed for measuring tooth thickness. The vertical slide sets the height of the tooth from crest to pitch circle and the horizontal slide measures the tooth thickness at the pitch circle.

Measuring Range for modul: 1-20 or D. P.: 25-1¼

The Vernier Caliper in range 1-20 modul or D. P. 25-1¼ has extra long Verniers, which greatly facilitate readings of 1/50 mm or 1/1000" (refer to illustration).
Black hardwood cases are optional.

Mahr GEAR TESTING EQUIPMENT

Workshop Gear Rolling Tester No. 894



for two flank roll testing of straight and helical spur gears, bevel and worm gears

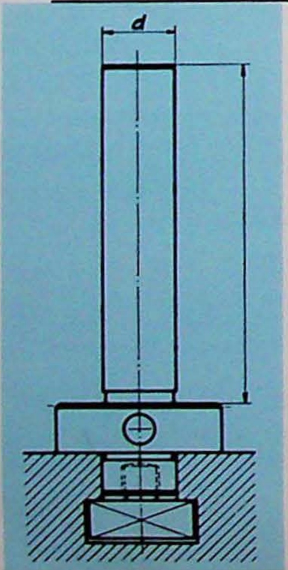
Method of Operations:

The tester uses the two flank roll test method. The gears under test are meshed without backlash either in pairs or with a master gear and are rotated manually, one of the gears being mounted on the table, the other on the floating measuring carriage. Gearing errors result in variations of the center distance which are transmitted from the floating measuring carriage to an indicator.

Features:

- Extremely solid and robust construction
- Reliable design obtained by frictionfree mounting of the floating measuring carriage
- Fast and accurate reading
- Universal application by use of the various attachments
- Adjustable measuring pressure of the floating carriage
- Quick release of measuring carriage for reloading without altering set-up

Specifications:	No. 894 A	894 C
Adjustable center distance	1″ — 6½″	2″ — 16″
Measuring pressure	¾ to 4½ lbs.	1 — 7 lbs.
Maximum weight of gear:		
on mounting table	45 lbs.	350 lbs.
on measuring carriage	22 lbs.	130 lbs.
Readings in	.0005″ or .000050″	.0005″ or .000050″
Steady attachment		
depth of throat	2⅜″	5″
center distance	2″ — 6″	5″ — 12¾″
Total length	20″	34″
Weight (incl. 1 steady attachment)	40 lbs.	175 lbs.



Rigid Mounting of the Mandrels

is guaranteed by precision machined T-slots in table. The mandrels fitted with sliding blocks can be moved in these slots and set to any required distance. All mandrels are interchangeable.

Mandrels No. 894 z

for model	894 A	894 C
diameter d	*.375″ .400″ .500″ .600″ .625″ .700″ .750″ .800″	.500″ .600″ .625″ .700″ *.750″ .800″ 1.000″ 1.250″
diameter tolerance	−.00005″ −.00015″	−.00005″ −.00015″
shank length	2″ 2⅜″ 3″	3½″ 4″ 5″

*2 of each are included as standard equipment. Specify diameter of shank required.

Attachments for Workshop Gear Rolling Tester No. 894

No. 894 w Steady Attachment with upper center and supporting center

to be used on the floating measuring carriage and on the mounting table, for mounting gears between centers. Both centers are **carbide** tipped (Fig. 3).

No.	Model	Depth of Throat inches	Center distance inches
894 w/A	894 A	2⅜	2—6
894 w/C	894 C	5	5—12½

Larger steady attachments available upon request.

No. 894 we Setting Gage for Steady Attachment

for accurate adjustment of the steady attachment when used on fixed mounting table. (This gage is not required for use of the steady attachment on the floating measuring carriage.)

No. 894 u Universal Angle Bracket with vertical slide (Fig. 4)

for testing bevel gears and for mounting the fixture No. 894 v for testing worms and worm gears.
Range of height adjustment with model 894 A 4⅜″, with model 894 C 7″.

No. 894 v Swivelling Support

for mounting worms when testing worms and worm gears in pairs and for testing spur gears and worm gears with master worms No. 894 h, in connection with the universal angle bracket No. 894 u (Fig. 5).

No.	Model	Depth of Throat	Max. center distance inches	For master worms D.P.
894 v1/A*	894 A	¾	2	120—12
894 v2/A*	894 A	1½	6	120—12
894 v/C	894 C	2⅜	6	50—3

*When using fixtures No. 894 v with No. 894 u on model No. 894 A an additional extension plate is necessary.

No. 894 k Mandrel for bevel gears

for use on Universal Angle Bracket No. 894 u (Fig. 4).

No.	Model	Diameter inches	Length inches
894 k/A	894 A	.300	1¼
894 k/C	894 C	.625	3¼

Other diameters and lengths upon request.

No. 894 g Master Gears for DP 50-2,5 (Fig. 3)

with straight or helical involute teeth.
A detailed special leaflet for master gears is available.

No. 894 gs Hydraulic Mandrel (Fig. 3)

for mounting master gears and setting them quickly and easily to any required height of the gear to be tested, its feature being strictly uniform gripping power and maximum concentricity.

Type	No.	894 A	894 C
Range of height adjustment of master gear	inches	5½	10
Diameter (surface hard chromium plated)	mm	22 or 32	32
Total length	inches	6¼	11

Mandrels of other measurements on request.

No. 894 h Master Worms for DP 120-3 (Fig. 5)

for roll testing spur and worm gears. The master worms are mounted between the centers of fixture No. 894 v and can be tilted to any required angle.

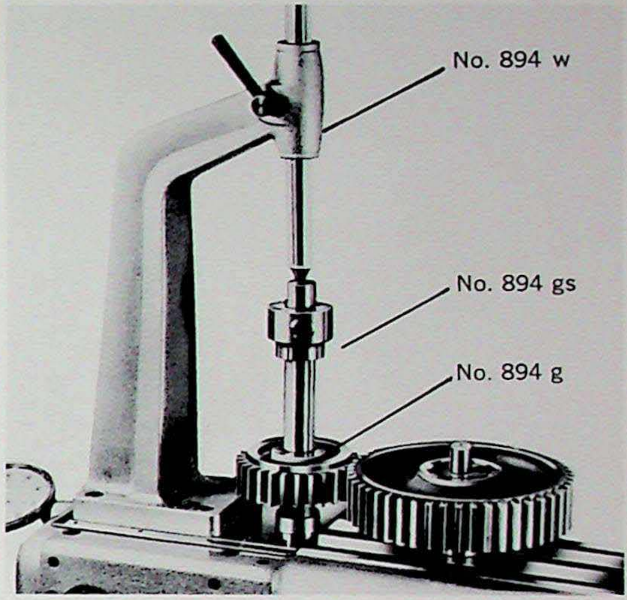


fig. 3

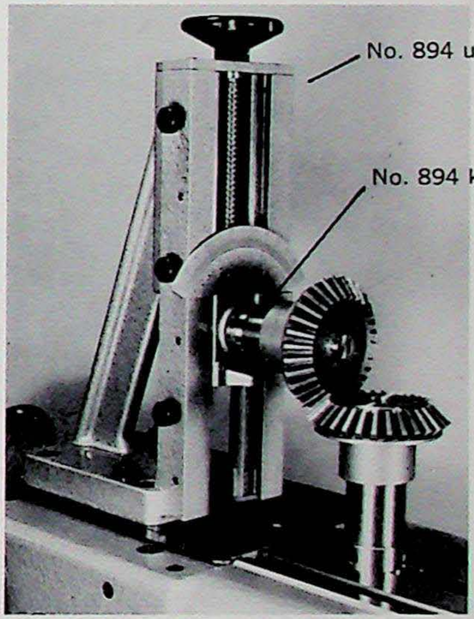
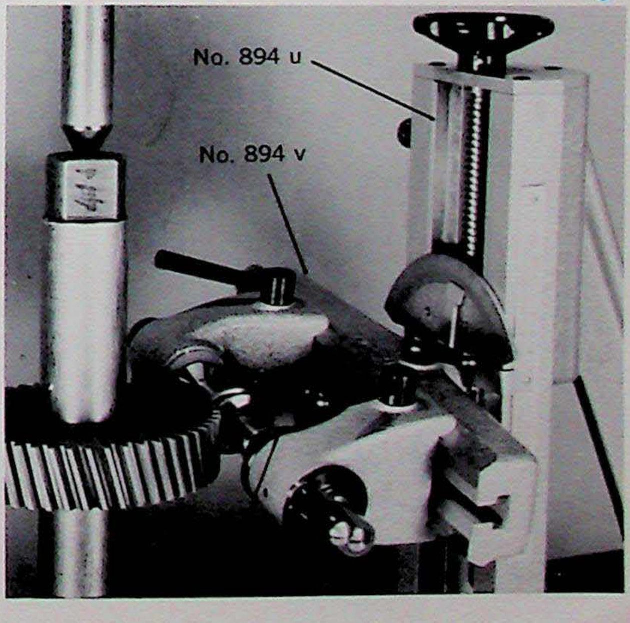


fig. 4

fig. 5



Mahr GEAR TESTING EQUIPMENT

No. 895

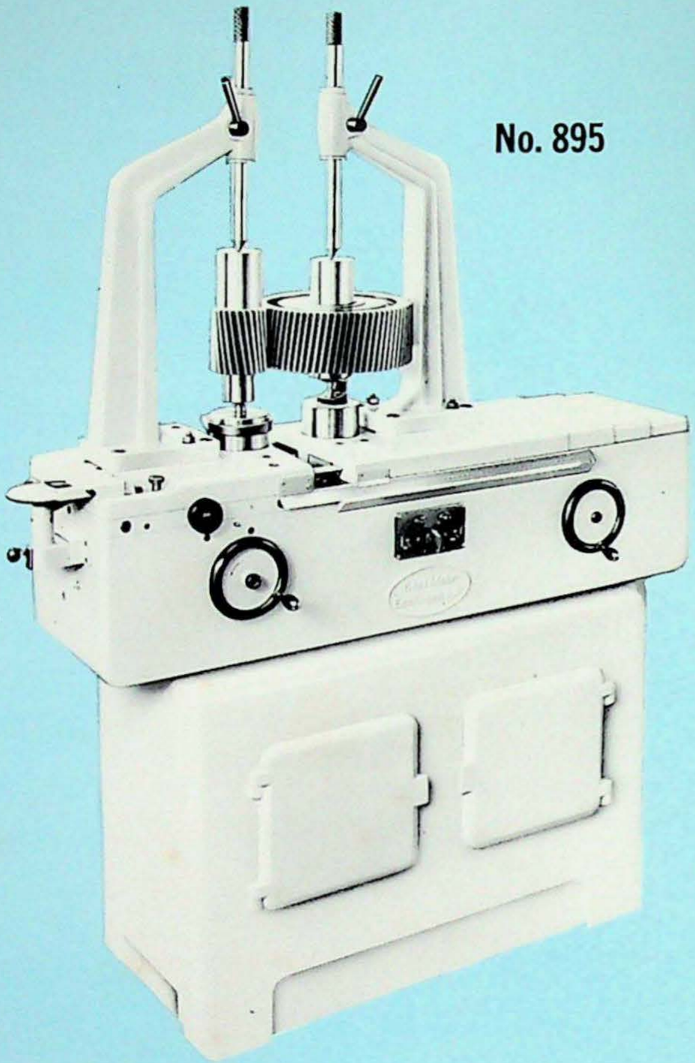
Gear Rolling Testers

- For external and internal spur and helical gears
- For bevel gears and worms

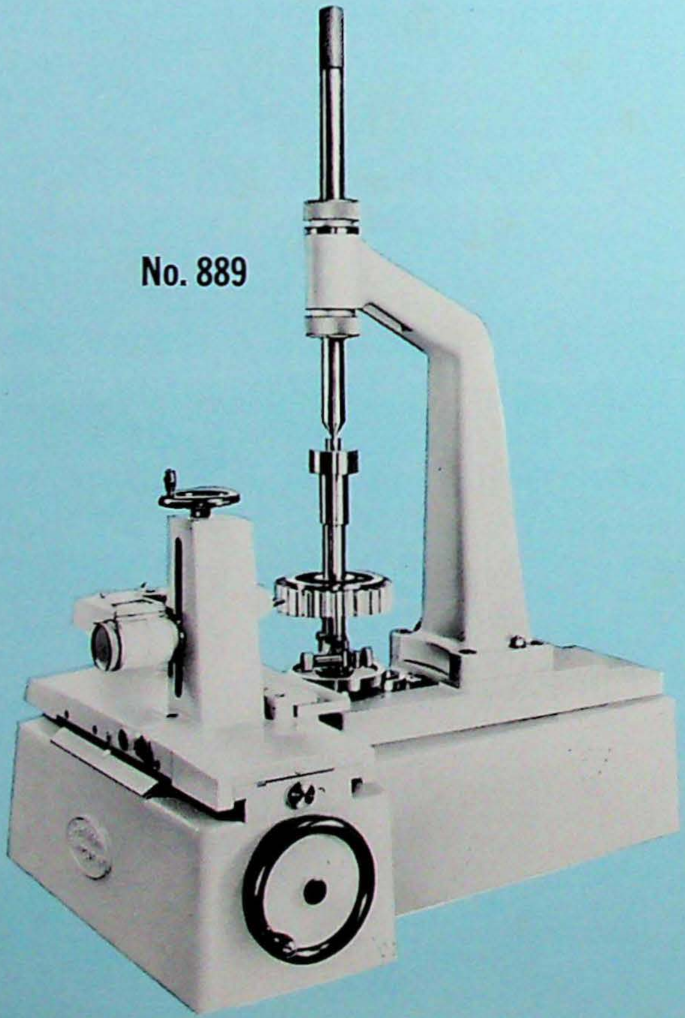
FEATURING

- Selectable Magnification—
  Three magnifications offer chart readings in .0001″, .0002″, and .0005″
- Three Models—
  from ⅝″-24″ center distance
- Selectable Rolling Speed—
  Six testing speeds ensure proper speed for size of gear
- Automatic Electric Drive—
  Electric drive automatically disengages after one revolution of test gear
- Choice of Circular or Strip Chart
- Adjustable Measuring Pressure
- Shockproof Mechanical Recorder

Request Special Folder No. 895



No. 895



No. 889

No. 889

Involute Measuring Instrument with Fixed Base Circle Discs

- For external and internal spur and helical gears

FEATURING

- Selectable Magnification—
  Two magnifications offer chart readings in .00005″ and .0001″
- Shockproof Mechanical Recorder—
  Approved for the workshop and grinding area
- Large Measuring Range—
  1-20″ (base circle diameter)
- Selectable Roll Ratio—
  1:1, 2:1, and 4:1
- Reversal Lever—
  Adjusts for left or right flank

Request Special Folder No. 889

No. 891 S

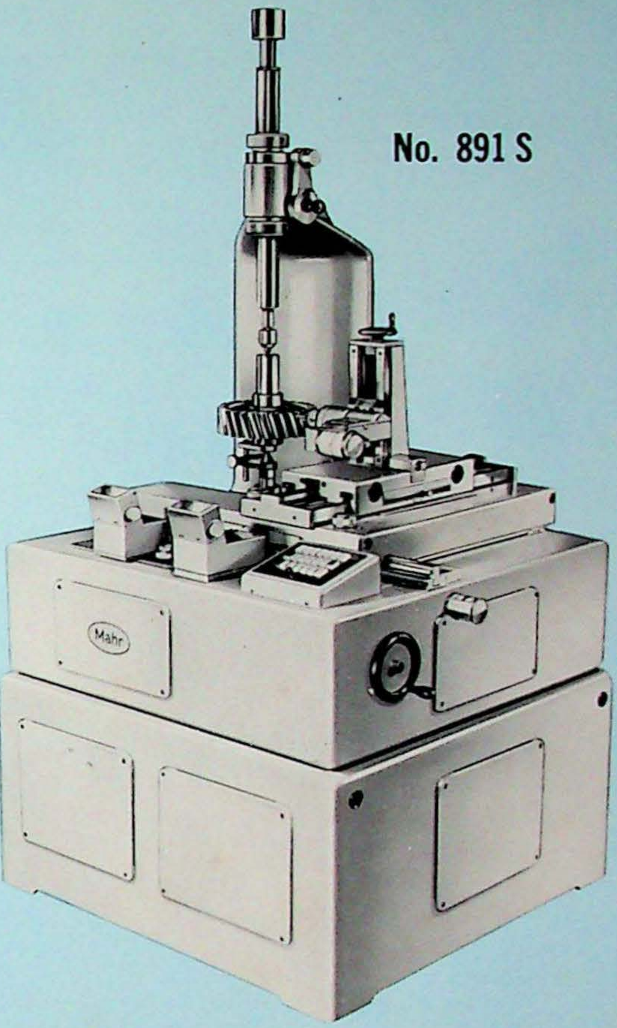
Involute and Lead Measuring Instrument with Optical Setting of Lead and Base Circle

- For external and internal spur and helical gears with base circle diameter from 0-22″

FEATURING

- Optical Setting of Lead and Base Circle—
  Both can be measured with one set-up
- Push-Button Control—
  Electric motor drive with six testing speeds for lead and involute
- Large Measuring Range—
  0-80° helix angle range
  0-22″ base circle diameter range
  550 lb. maximum weight of gear
- Selectable Magnification—
  Three magnifications offer chart readings in .00005″, .0001″, .0002″
- Shockproof Mechanical Recorder—
  Overtravel in the recorder plus a measuring stylus which unhinges at overload
- Most Accurate Design—
  During the lead check the recording unit is secured; only the gear under test is moved. Slide rails which can cause errors in transmission have been eliminated.

Request Special Folder No. 891


No. 891 S

OTHER MAHR PRODUCTS

Gear Testing Equipment

No. 890 Involute Measuring Instrument with optional base circle setting.

No. 892 Universal Gear Tester.

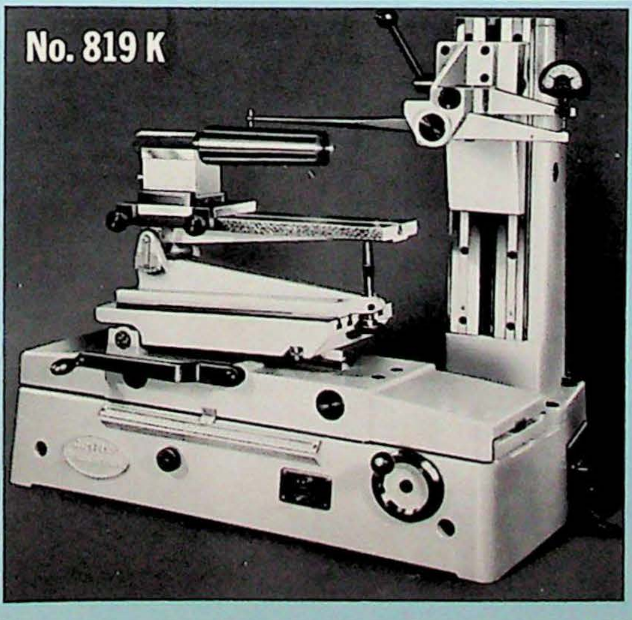
Hydraulic Expanding Mandrels

Hydraulic operated for precision mounting of gears, other work pieces and tools.

LIMIT GAGES

Plug Gages, Taper Gages, Spline Gages, Thread Limit Gages, Thread Setting Gages.

Request quotations.


No. 819 K

No. 819 K Taper Measuring Instrument

- For external and internal tapers

FEATURING

- A new method for measuring a taper directly—accurate mounting of the test piece is not necessary
- Push-Button Control—
  Electric motor drive with six testing speeds is available
- Large Testing Range—
  30° maximum taper angle
  11″ maximum taper length

Request Special Folder No. 819 K

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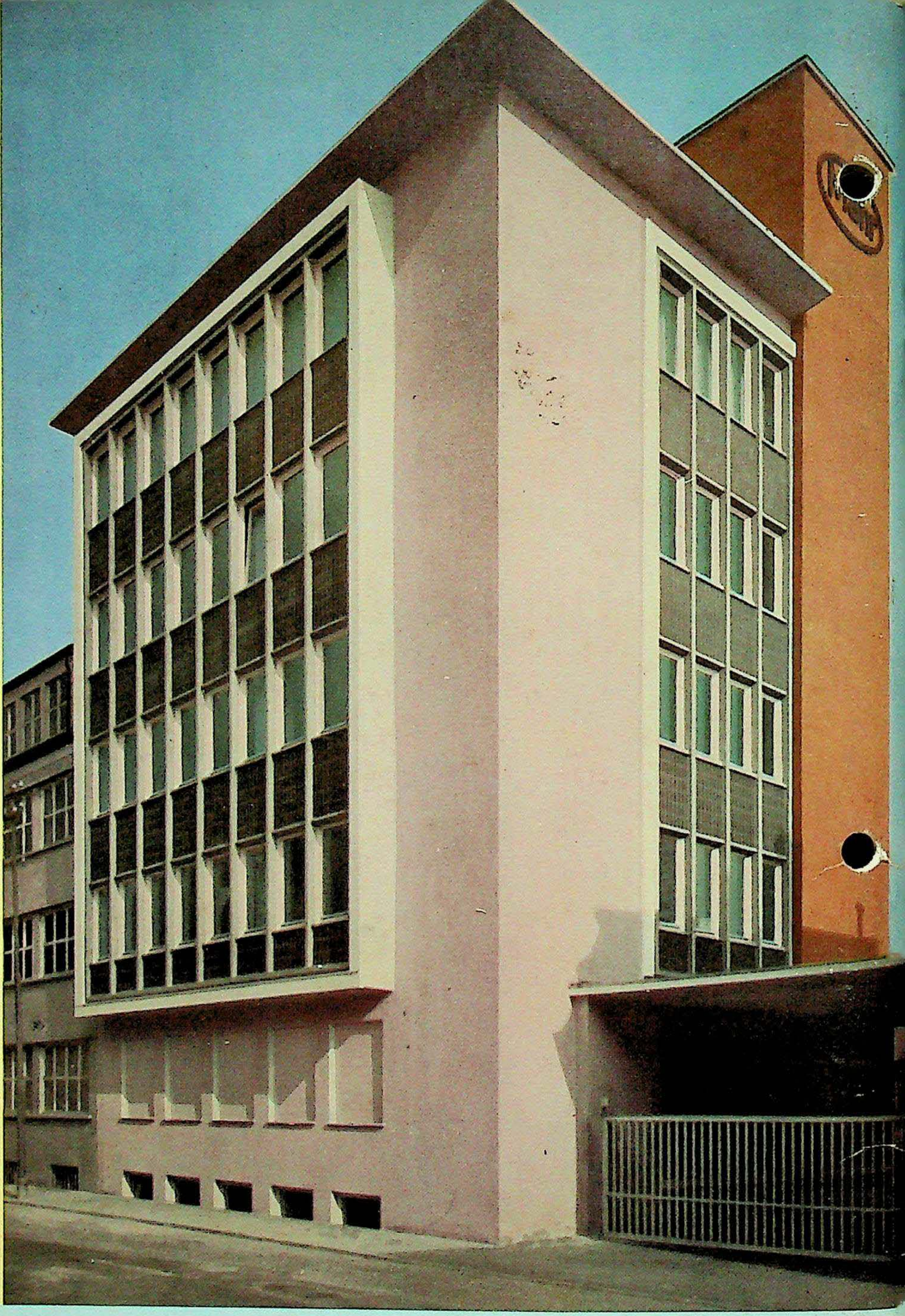

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